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# HOLT MATHEMATICS SYSTEM BOOK 6





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# HOLT MATHEMATICS SYSTEM BOOK 6

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Holt, Rinehart and Winston of Canada, Limited  
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Printed in Canada

Creative art by Graham Bardell.  
Assembly and technical art by David Hunter.

Consulting Editor Rob Devine  
Production Editor Sharon Dzubinsky

Canadian Cataloguing in Publication Data

Bye, Marshall P., 1928-  
Holt mathematics system, book 6

For use in grade 6.  
Includes index.

ISBN 0-03-920038-8

1. Mathematics — 1961 — I. Title.

QA107.B946 510 C80-094230-2

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ISBN 0-03-920038-8

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The authors of the *Holt Mathematics System* wish to thank the following teachers for their invaluable comments and suggestions resulting from the Grade 6 pilot testing in their classrooms.

Gordon Cook  
Queen Victoria Public School  
Hamilton, Ontario

Jim Harrop  
George Lee School  
Regina, Saskatchewan

David N. Lowey  
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Rick MacMillan  
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# Chapter 1

# Whole Numbers and Decimals

Place Value

Addition and Subtraction

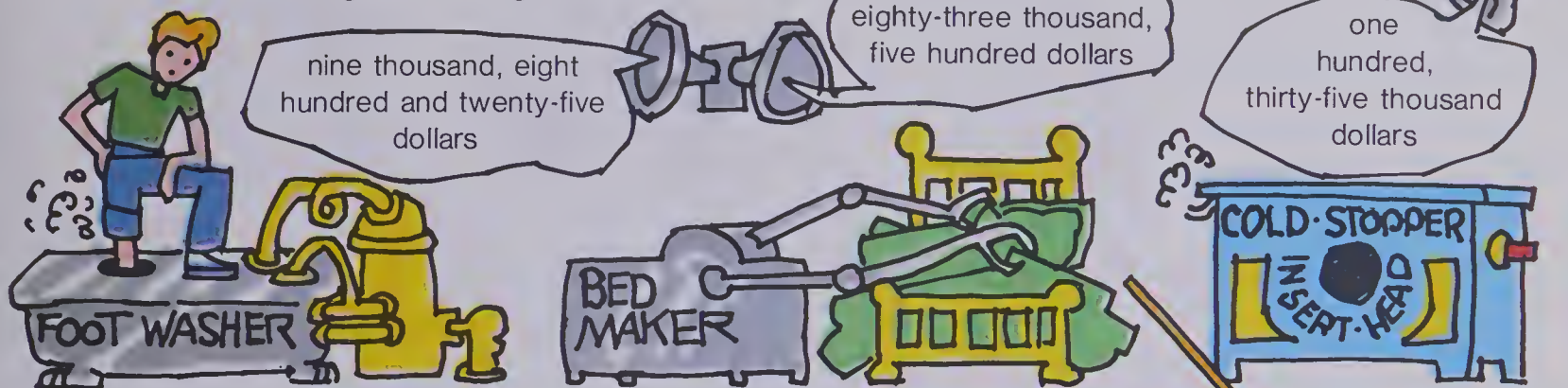
Estimation and Rounding





# Marvelous Machines

Doctor Ivan is selling his strange machines.



We can show the prices in a place-value chart.

	thousands	hundreds	tens	ones	
The foot washer →		9	8	2	\$ 9 825
The bed maker →		8	3	5	\$ 83 500
The cold stopper →	1	3	5	0	\$135 000



## Exercises

### 1. Read.

- |             |             |             |            |
|-------------|-------------|-------------|------------|
| (a) 348 276 | (b) 685 203 | (c) 97 082  | (d) 75 600 |
| (e) 8270    | (f) 956 801 | (g) 3657    | (h) 60 390 |
| (i) 84 062  | (j) 33 333  | (k) 347 852 | (l) 4608   |

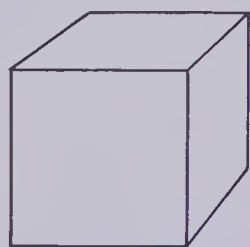
### 2. Write in a place-value chart.

- |  |                                      |
|--|--------------------------------------|
| (a) eighty-eight thousand, four hundred fifty-nine       |                                      |
| (b) five hundred sixty thousand, seven hundred fifty-two |                                      |
| (c) ninety-one thousand, six hundred twenty              |                                      |
| (d) two thousand, seven hundred thirty-four              | (e) five thousand, two hundred seven |

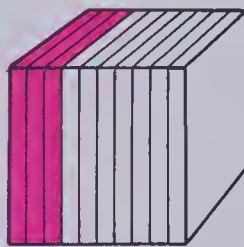
### 3. Write the place value of each underlined digit.

- |                     |                     |                    |                      |
|---------------------|---------------------|--------------------|----------------------|
| (a) 4 <u>7</u> 65   | (b) <u>9</u> 53     | (c) <u>1</u> 6 384 | (d) 54 <u>6</u> 00   |
| (e) 66 <u>3</u> 478 | (f) <u>5</u> 00 362 | (g) <u>1</u> 8 603 | (h) 4 <u>3</u> 7 052 |

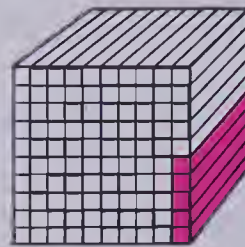
# Decimals



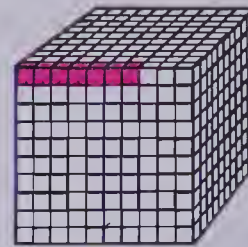
1



$\frac{3}{10}$  or 0.3

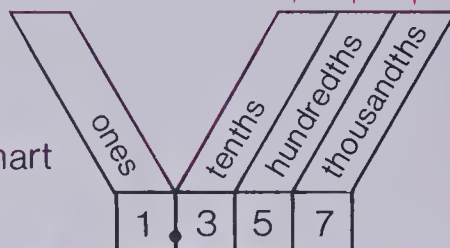


$\frac{5}{100}$  or 0.05



$\frac{7}{1000}$  or 0.007

Place-value chart



We say:

one and three hundred fifty-seven thousandths  
or  
one decimal three five seven.

We write:

$1\frac{357}{1000}$   
or  
1.357.

## Exercises

1. Read each in two ways.

- |             |            |             |            |             |
|-------------|------------|-------------|------------|-------------|
| (a) 7.2     | (b) 0.3    | (c) 4.7     | (d) 13.4   | (e) 64.9    |
| (f) 35.05   | (g) 8.13   | (h) 19.38   | (i) 55.09  | (j) 12.77   |
| (k) 6.002   | (l) 4.369  | (m) 23.408  | (n) 12.042 | (o) 69.313  |
| (p) 200.011 | (q) 87.413 | (r) 346.007 | (s) 68.019 | (t) 500.845 |

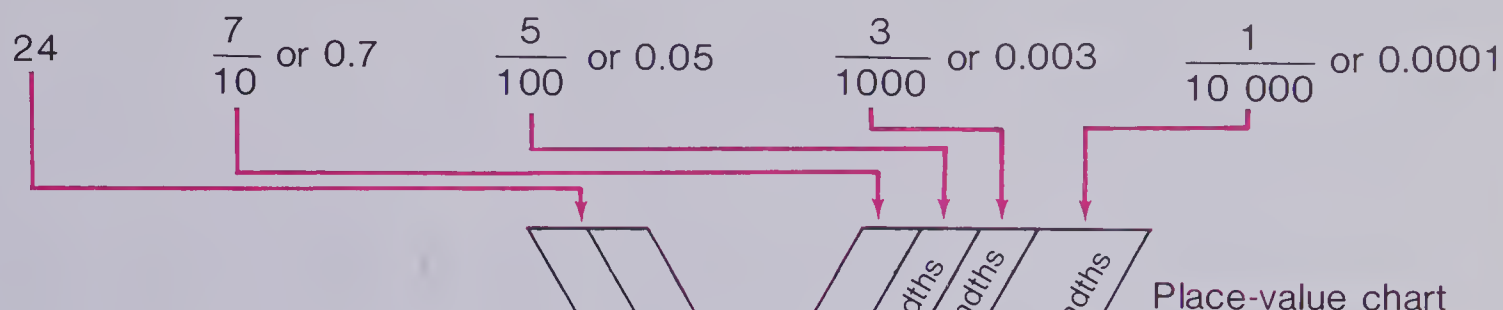
2. Write each as a decimal.

- |                         |                         |                         |                         |                        |
|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|
| (a) $7\frac{3}{10}$     | (b) $13\frac{9}{10}$    | (c) $63\frac{7}{10}$    | (d) $214\frac{2}{10}$   | (e) $78\frac{8}{10}$   |
| (f) $18\frac{89}{100}$  | (g) $7\frac{27}{100}$   | (h) $32\frac{16}{100}$  | (i) $6\frac{7}{100}$    | (j) $41\frac{9}{100}$  |
| (k) $2\frac{235}{1000}$ | (l) $5\frac{147}{1000}$ | (m) $11\frac{26}{1000}$ | (n) $50\frac{47}{1000}$ | (o) $16\frac{5}{1000}$ |

3. Write the place-value meaning of each underlined digit.

- |                     |                    |                     |                     |                    |
|---------------------|--------------------|---------------------|---------------------|--------------------|
| (a) 8.4 <u>3</u> 2  | (b) 3. <u>9</u> 76 | (c) 17.2 <u>0</u> 3 | (d) 28.0 <u>3</u> 2 | (e) 88.00 <u>4</u> |
| (f) 46. <u>1</u> 78 | (g) 80.6 <u>7</u>  | (h) 10. <u>4</u>    | (i) 701.38 <u>2</u> | (j) 19.0 <u>5</u>  |

# More Decimals



We say:

twenty-four and seven thousand, five hundred  
thirty-one ten thousandths

or

twenty-four decimal seven five three one.

We write:

$$24 \frac{7531}{10\ 000}$$

or

24.7531.

## Exercises

1. Read each in two ways.

- |            |            |             |             |             |
|------------|------------|-------------|-------------|-------------|
| (a) 7.7614 | (b) 3.263  | (c) 8.68    | (d) 10.3    | (e) 9.8826  |
| (f) 0.061  | (g) 36.54  | (h) 28.715  | (i) 40.3946 | (j) 36.9    |
| (k) 6.0042 | (l) 75.102 | (m) 11.0001 | (n) 83.65   | (o) 68.0043 |

2. Write as a fraction.

- |            |             |            |              |
|------------|-------------|------------|--------------|
| (a) 1.7    | (b) 8.35    | (c) 2.384  | (d) 17.2371  |
| (e) 36.053 | (f) 97.0072 | (g) 43.601 | (h) 236.7003 |

3. Write as a decimal.

- |                          |                            |                             |                           |
|--------------------------|----------------------------|-----------------------------|---------------------------|
| (a) $3 \frac{487}{1000}$ | (b) $29 \frac{8}{100}$     | (c) $37 \frac{29}{10\ 000}$ | (d) $41 \frac{447}{1000}$ |
| (e) $19 \frac{71}{100}$  | (f) $82 \frac{3}{10\ 000}$ | (g) $157 \frac{43}{1000}$   | (h) $446 \frac{9}{10}$    |

4. Write the place-value meaning for each underlined digit.

- |                      |                       |                      |                     |
|----------------------|-----------------------|----------------------|---------------------|
| (a) 76.54 <u>2</u> 9 | (b) 107.05 <u>6</u> 9 | (c) 25. <u>7</u> 462 | (d) 91.4 <u>1</u> 3 |
|----------------------|-----------------------|----------------------|---------------------|

5. Write as a decimal.

- |   |   |
|---|---|
| (a) twenty-four and thirty-seven hundredths | (c) forty and fifty-six ten thousandths |
| (b) seven and nineteen thousandths          |   |



# Tune Up—Addition

Add.

1. (a)	8	(b)	4	(c)	9	(d)	33	(e)	80
	6		7		8		85		47
	7		8		0		94		60
	4		5		4		4		38
	3		2		7		+69		+76
	+6		+5		+2		<u>      </u>		<u>      </u>
	<u>      </u>		<u>      </u>		<u>      </u>				

2. (a)	6764	(b)	4682	(c)	\$605.75	(d)	\$917.36	(e)	\$483.81
	4237		3007		26.32		402.95		741.32
	+4609		63		+974.37		5.32		400.16
	<u>      </u>		+9572		<u>      </u>		+427.70		28.38
			<u>      </u>				<u>      </u>		+768.02
									<u>      </u>

3. (a)  $3 + 7 + 6 + 2 + 7$   
 (c)  $91 + 42 + 34 + 41$   
 (e)  $13 + 27 + 3 + 70$

(b)  $4 + 6 + 9 + 3 + 0$   
 (d)  $62 + 4 + 90 + 54$

4. (a)  $676 + 426 + 375$

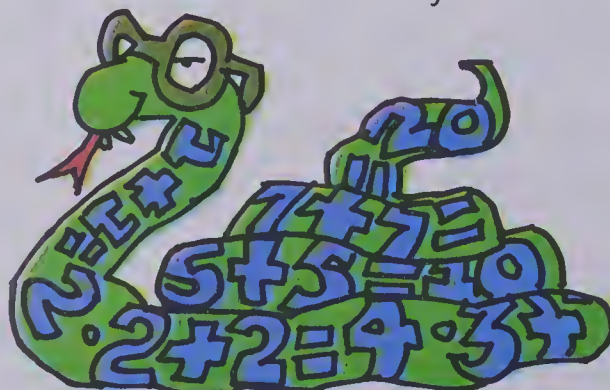
(b)  $403 + 210 + 654$

(c)  $7483 + 68 + 745 + 774$

(d) \$8603.17 plus \$4328.20

5. During the Rick's Record Shop Super Sale, 489 albums were sold on Friday, 976 were sold on Saturday, and 287 were sold on Sunday. How many albums were sold during the three days?

Are you a super adder,  
 good adder,  
 average adder?



Super	18-20
Good	13-17
Average	10-12

# Tune Up—Subtraction

Subtract.

1. (a) 
$$\begin{array}{r} 645 \\ - 128 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 390 \\ - 149 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 8207 \\ - 4939 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 4700 \\ - 1321 \\ \hline \end{array}$$

2. (a) 
$$\begin{array}{r} 94\,329 \\ - 25\,530 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 60\,022 \\ - 7\,869 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 56\,004 \\ - 28\,226 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 68\,247 \\ - 4\,909 \\ \hline \end{array}$$

3. (a) 
$$\begin{array}{r} 588\,467 \\ - 361\,187 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 207\,156 \\ - 39\,078 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 800\,000 \\ - 17\,876 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 294\,094 \\ - 3\,685 \\ \hline \end{array}$$

4. (a) 
$$\begin{array}{r} \$219.78 \\ - 27.83 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} \$20.59 \\ - 14.58 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} \$4768.00 \\ - 2176.46 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} \$56\,834.16 \\ - 7\,462.27 \\ \hline \end{array}$$

5. (a)  $429 - 267$  (b)  $700 - 287$  (c)  $\$347.76 - \$50.62$  (d)  $\$7624.39 - \$4552.50$

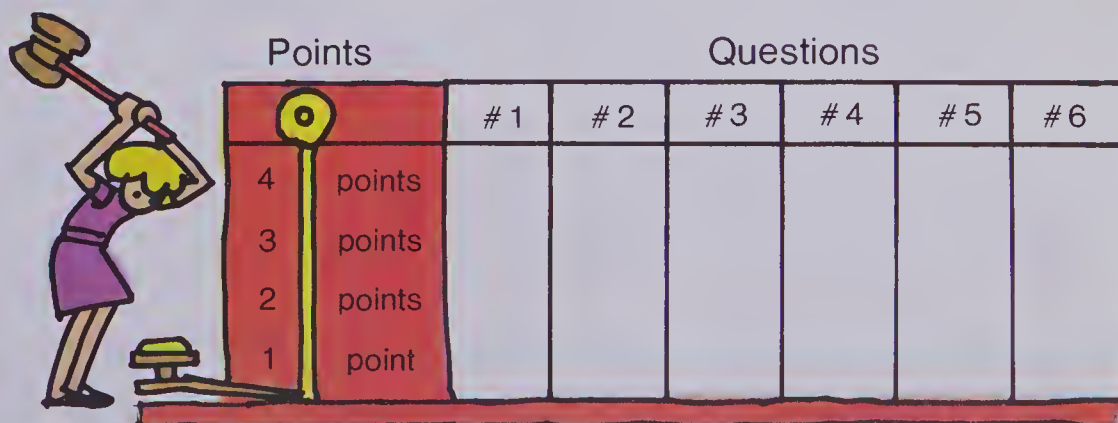
6. (a) How much less than 11 000 is 7560?  
 (b) What is the difference between 29 362 and 76 840?  
 (c) 68 000 minus 9765  
 (d) It is 2365 km to Vancouver.

The Browns have driven 1870 km toward Vancouver.

How many more kilometres do they have to travel?

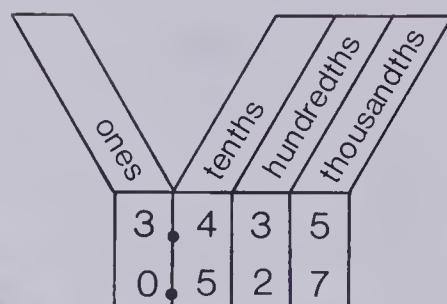
Each correct answer is worth 1 point.

Copy and graph your results.



# Adding Decimals I

$$3.435 + 0.527 = ?$$



Hint:  
Line up the decimals.

$$\begin{array}{r} 3.435 \\ + 0.527 \\ \hline 3.962 \end{array}$$

Write →

$$3.435 + 0.527 = 3.962$$

## Exercises

1. Copy and complete.

(a) Write → 
$$\begin{array}{r} 2.2 \\ 6.4 \\ \hline \end{array}$$

(b) Write → 
$$\begin{array}{r} \square.\square \\ \square.\square \\ \hline \square.\square \end{array}$$

(c) 
$$\begin{array}{r} 7.3 \\ + 1.9 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 13.68 \\ + 8.26 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 26.50 \\ + 14.25 \\ \hline \end{array}$$

(f) 
$$\begin{array}{r} 37.07 \\ + 11.60 \\ \hline \end{array}$$

(g) 
$$\begin{array}{r} 48.93 \\ + 19.48 \\ \hline \end{array}$$

(h) 
$$\begin{array}{r} 231.37 \\ + 429.84 \\ \hline \end{array}$$

(i) 
$$\begin{array}{r} 7.428 \\ 9.604 \\ + 4.843 \\ \hline \end{array}$$

(j) 
$$\begin{array}{r} 8.666 \\ 4.287 \\ + 16.005 \\ \hline \end{array}$$

(k) 
$$\begin{array}{r} 5.006 \\ 0.276 \\ 36.305 \\ + 42.444 \\ \hline \end{array}$$

(l) 
$$\begin{array}{r} 0.6125 \\ 0.4073 \\ 0.3214 \\ + 0.0786 \\ \hline \end{array}$$

(m) 
$$\begin{array}{r} 4.3856 \\ 7.1074 \\ 5.4923 \\ + 3.6701 \\ \hline \end{array}$$

2. Write in columns, and then add.

(a)  $7.326 + 4.475$

(d)  $17.493 + 49.851$

(g)  $35.5 + 63.9 + 98.3$

(j)  $57.05 + 32.327$

(b)  $36.99 + 80.62$

(e)  $17.08 + 448.12$

(h)  $3.4685 + 7.9126 + 7.3074$

(k)  $36.7264 + 9.4756 + 42.3898$

(c)  $40.5 + 27.3$

(f)  $796.52 + 473.06$

(i)  $0.27 + 0.38 + 0.05$

(l)  $542.63 + 35.24 + 498.81$



# Adding Decimals II

Barbara measured 3 lines. Their lengths were 3.7 m, 14.08 m, and 9.4 m. She found the total length by adding.

$$\begin{array}{r} \phantom{1} \phantom{1} \\ 3 \phantom{0} 7 \\ 14 \phantom{0} 08 \\ + 9 \phantom{0} 4 \\ \hline 27 \phantom{0} 18 \end{array}$$

Remember, keep the decimal points under each other.



Altogether, the lines measured 27.18 m.

## Exercises

### 1. Add.

(a) 
$$\begin{array}{r} 4.68 \\ 3.1 \\ + 24.75 \\ \hline \end{array}$$

■■■■

(b) 
$$\begin{array}{r} 36.742 \\ 4.8 \\ + 15.748 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 104.53 \\ 37.469 \\ + 41.0372 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 74.05 \\ 13.176 \\ + 342.9 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 52.517 \\ 3.46 \\ 957.634 \\ + 4.17 \\ \hline \end{array}$$

(f) 
$$\begin{array}{r} 30.0 \\ 57.463 \\ 8.1754 \\ + 56.82 \\ \hline \end{array}$$

(g) 
$$\begin{array}{r} 8.715 \\ 19.4602 \\ 9.44 \\ + 26.953 \\ \hline \end{array}$$

(h) 
$$\begin{array}{r} 3.45 \\ 28.6004 \\ 13.501 \\ + 57.2765 \\ \hline \end{array}$$

### 2. Write the numbers in columns, and then add.

(a)  $4.53 + 9.761 + 6.449$

(c)  $142.76 + 37.541 + 3.7$

(e)  $645.38 + 39.4 + 4.7621$

(g)  $900.0 + 42.358 + 16.4417$

(i)  $28.49 + 56.7 + 38.985 + 62.51$

(b)  $26.4 + 13.563 + 48.5$

(d)  $59.61 + 347.555 + 98.3$

(f)  $3468.9 + 490.76 + 713.459$

(h)  $34.0 + 76.99 + 187.4167$

3. Mr. Davis painted 3 lines for schoolyard games. One was 3.45 m, another was 12.4 m, and the last was 8.55 m. How long are these altogether?

# Subtracting Decimals

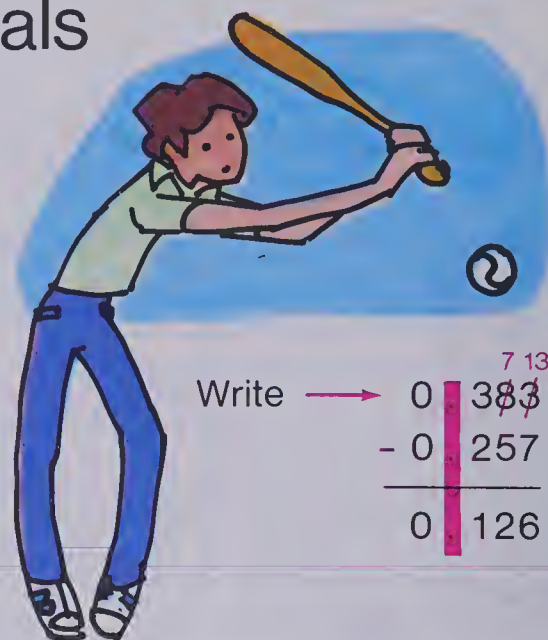
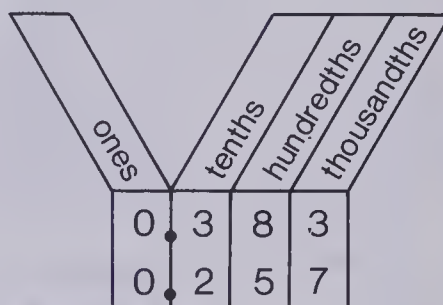
John's batting average in baseball is 0.383.

Henry's batting average is 0.257.

How much better is John's batting average than Henry's?

To find out, we must subtract:

$$0.383 - 0.257$$



Write  $\rightarrow$

$$\begin{array}{r} 0.383 \\ - 0.257 \\ \hline 0.126 \end{array}$$

John's batting average is better by 0.126.

## Exercises

1. Copy and complete.

(a)

ones	tenths
8	8
2	2

Write  $\rightarrow$

$$\begin{array}{r} 8.8 \\ - 2.2 \\ \hline \end{array}$$

■.■

(b)

ones	tenths	hundredths	thousandths
7	4	9	9
4	2	8	9

Write  $\rightarrow$

$$\begin{array}{r} \text{■.■■■} \\ - \text{■.■■■} \\ \hline \text{■.■■■} \end{array}$$

(c)  $\begin{array}{r} 48.844 \\ - 24.379 \\ \hline \end{array}$       (d)  $\begin{array}{r} 75.721 \\ - 37.346 \\ \hline \end{array}$       (e)  $\begin{array}{r} 53.415 \\ - 35.148 \\ \hline \end{array}$       (f)  $\begin{array}{r} 8.5232 \\ - 3.2642 \\ \hline \end{array}$       (g)  $\begin{array}{r} 4.7800 \\ - 2.3489 \\ \hline \end{array}$

2. Write in columns, and then calculate.

(a)  $8.9 - 3.3$       (b)  $59.46 - 32.13$       (c)  $340.8 - 70.2$       (d)  $46.658 - 18.279$   
 (e)  $95.76 - 31.40$       (f)  $7.7006 - 2.6225$       (g)  $80.85 - 45.38$       (h)  $0.902 - 0.418$   
 (i)  $517.5 - 270.2$       (j)  $0.4468 - 0.1859$       (k)  $56.91 - 27.65$

3. Janet's batting average is 0.319. Gail's is 0.280.

How much better is Janet's average than Gail's?

# Tricky Zeros

Ted weighs two parcels. Their masses are 5.7 kg and 2.83 kg.  
How much heavier is the first parcel?

$$\begin{array}{r} 5.70 \\ - 2.83 \\ \hline 2.87 \end{array}$$

5.7 = 5.70  
Ted uses this to help subtract.



The first parcel is 2.87 kg heavier.

## Exercises

Copy and complete.

1. (a) 
$$\begin{array}{r} 7.5 \\ - 4.37 \\ \hline \end{array}$$



$$\begin{array}{r} 7.5\blacksquare \\ - 4.37 \\ \hline \blacksquare.\blacksquare\blacksquare \end{array}$$

(b) 
$$\begin{array}{r} 13.8 \\ - 6.59 \\ \hline \end{array}$$



$$\begin{array}{r} \blacksquare\blacksquare.\blacksquare\blacksquare \\ - \blacksquare.\blacksquare\blacksquare \\ \hline \blacksquare.\blacksquare\blacksquare \end{array}$$

(c) 
$$\begin{array}{r} 36.8 \\ - 12.42 \\ \hline \end{array}$$

2. (a) 
$$\begin{array}{r} 14.6 \\ - 8.53 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 176.2 \\ - 49.12 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 35.0 \\ - 12.52 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 984.0 \\ - 381.48 \\ \hline \end{array}$$

3. (a) 
$$\begin{array}{r} 19.48 \\ - 6.579 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 8.07 \\ - 5.769 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 44.76 \\ - 29.483 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 2762.59 \\ - 563.427 \\ \hline \end{array}$$

4. (a) 
$$\begin{array}{r} 156.7 \\ - 76.98 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 32.9 \\ - 16.485 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 8598.6 \\ - 342.449 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 301.02 \\ - 98.916 \\ \hline \end{array}$$

5. Subtract.

(a)  $68.5 - 59.12$

(b)  $347.66 - 126.796$

(c)  $7542 - 339.51$

(d)  $258.7 - 176.428$

(e)  $884 - 245.7$

(f)  $1675.68 - 340.612$

(g)  $37 - 19.4576$

(h)  $5685.2 - 3497.587$

(i)  $8469 - 357.76$

6. Marcia has a mass of 37.6 kg. Julie has a mass of 46.3 kg.  
How much heavier is Julie?



# Millions

	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
<b>A</b>			3	7	6	8	5	4	7
<b>B</b>		5	7	3	0	2	8	3	9
<b>C</b>	8	4	7	3	3	5	2	9	6

**A**  
 3 000 000  
 700 000  
 60 000  
 8 000  
 500  
 40  
 7  
 —————  
 3 768 547

**B**  
 50 000 000  
 7 000 000  
 300 000  
 2 000  
 800  
 30  
 9  
 —————  
 57 302 839

**C**  
 800 000 000  
 40 000 000  
 7 000 000  
 300 000  
 30 000  
 5 000  
 200  
 90  
 6  
 —————  
 847 335 296

- A** three million, seven hundred sixty-eight thousand, five hundred forty-seven  
**B** fifty-seven million, three hundred two thousand, eight hundred thirty-nine  
**C** eight hundred forty-seven million, three hundred thirty-five thousand, two hundred ninety-six

## Exercises

1. Write each number in words.

- (a) 7 682 487      (b) 9 470 365      (c) 76 043 882      (d) 504 003 905  
 (e) 89 150 327      (f) 351 004 203      (g) 769 000 200

2. Write each in a place-value chart.

- (a) three million, five hundred sixty-one thousand, two hundred thirty  
 (b) eighty-four million, one hundred five thousand, nine hundred seventy-two  
 (c) four hundred thirty-eight million, fifty-six thousand, one hundred nine  
 (d) one hundred fifty-two million, nine hundred thousand  
 (e) two million, eighty-four thousand, seventy

3. In the number 685 342 017, write the digit that is in each of these places.

- (a) ten millions      (b) thousands      (c) tens      (d) hundred thousands  
 (e) ten thousands      (f) hundreds      (g) ones      (h) hundred millions

# Billions

A famous hamburger chain sold twenty-four billion hamburgers.  
We can show the number twenty-four billion in a place-value chart.



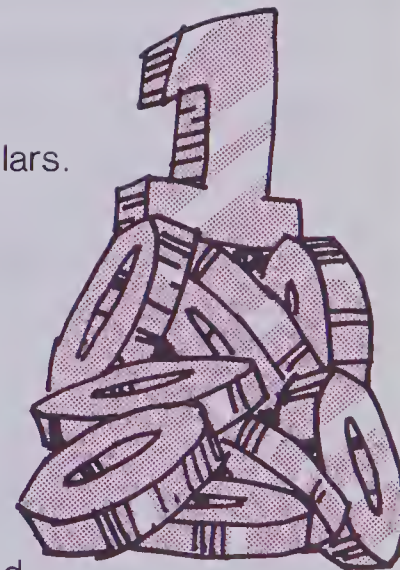
hundred billions	billions	ten billions	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
	2	4	0	0	0	0	0	0	0	0	0

24 000 000 000 hamburgers were sold.

## Exercises

Write each number in a place-value chart.

- A steel company's gross sales in one year was 1 billion, 8 million dollars.
- The steel company's net profit was 120 million dollars.
- An oil company's gross sales in the first quarter of the year was 18 billion, 700 million dollars.
- The oil company's gross sales in the next quarter was 15 billion, 200 million dollars.
- The volume of trading at the stock market on one day was 3 million, 21 thousand shares, valued at 38 million, 92 thousand dollars.
- The volume of trading on the following day was 3 million, 57 thousand shares, valued at 45 million, 42 thousand dollars.
- In Britain, 318 million, 457 thousand prescriptions were written by doctors in one year.
- The total cost of the drugs prescribed was 14 billion dollars.



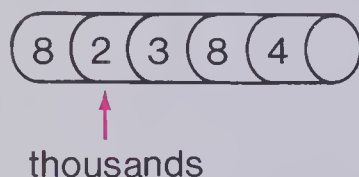


# Rounding Whole Numbers

Janice wants to round 82 384 to the nearest thousand.  
Here is how she does it.

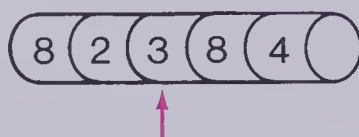
## Step 1

She finds the thousand's digit.



## Step 2

She finds the next digit to the right.



Janice rounds 82 384 to 82 000. Why?

## Step 3

If that digit is 5 or more, Janice makes the thousand's digit one greater.  
If that digit is 4 or less, the thousand's digit remains the same.



## Exercises

Use Janice's three steps to help you.

1. Round to the nearest hundred.

- |             |            |          |            |             |
|-------------|------------|----------|------------|-------------|
| (a) 412     | (b) 8965   | (c) 5278 | (d) 34 834 | (e) 523 389 |
| (f) 486 205 | (g) 39 449 | (h) 6298 | (i) 40 354 |             |

2. Round to the nearest ten thousand.

- |             |            |             |             |
|-------------|------------|-------------|-------------|
| (a) 85 270  | (b) 17 049 | (c) 585 938 | (d) 473 162 |
| (e) 955 420 | (f) 61 027 | (g) 457 231 | (h) 90 235  |

3. Round to the nearest hundred thousand.

- |             |               |                |
|-------------|---------------|----------------|
| (a) 478 327 | (b) 934 856   | (c) 5 278 332  |
| (d) 627 345 | (e) 7 498 287 | (f) 16 337 441 |

4. Round to the nearest million.

- |                |                |                 |
|----------------|----------------|-----------------|
| (a) 9 437 238  | (b) 85 848 000 | (c) 485 287 123 |
| (d) 95 948 246 | (e) 90 617 745 | (f) 486 592 614 |

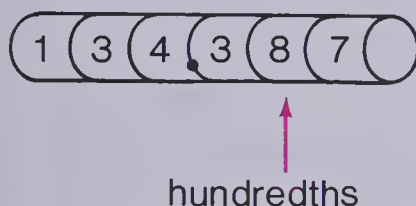


# Rounding Decimal Numbers

Ron wants to round 134.387 to the nearest hundredth.  
Here is how he does it.

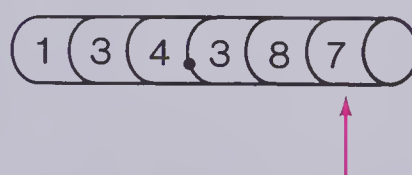
## Step 1

He finds the hundredth's digit.



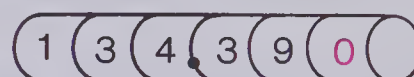
## Step 2

He finds the next digit to the right.



## Step 3

If that digit is 5 or more, the hundredth's digit becomes one greater. If the digit is 4 or less, the hundredth's digit stays the same.



Ron rounds 134.387 to 134.39. Why?

## Exercises

Use Ron's three steps to help you.

1. Round to the nearest tenth.

- |            |            |            |             |
|------------|------------|------------|-------------|
| (a) 7.48   | (b) 8.32   | (c) 26.29  | (d) 48.35   |
| (e) 385.14 | (f) 49.359 | (g) 16.476 | (h) 500.076 |

2. Round to the nearest hundredth.

- |            |             |            |             |
|------------|-------------|------------|-------------|
| (a) 13.654 | (b) 4.175   | (c) 37.349 | (d) 3.666   |
| (e) 68.071 | (f) 400.688 | (g) 32.005 | (h) 428.502 |

3. Round to the nearest whole number.

- |           |            |            |             |
|-----------|------------|------------|-------------|
| (a) 7.128 | (b) 28.87  | (c) 624.8  | (d) 49.42   |
| (e) 48.79 | (f) 500.92 | (g) 85.249 | (h) 948.049 |

4. John cycled 9.48 km to school. About how far did he cycle? Round to the nearest tenth.

# Estimating

An estimate tells “*about* how many” things are in an answer or set. To estimate, round the actual numbers first, and then calculate.

Actual	Estimate	Actual	Estimate	Actual	Estimate
583	600			\$ 63.52	\$ 60
604	Round to → 600			27.26	Round to → 30
462	500			34.68	30
387	400	1981	2000	+ 48.43	+ 50
+ 727	+ 700	- 1633	Round to → - 1600		
■■■■	about 2800	■■■	about 400	\$ ■■■.■■	about \$ 170

## Exercises

Estimate, and then check by calculating the actual amount.

- |        |                |        |            |        |        |        |
|--------|----------------|--------|------------|--------|--------|--------|
| 1. 748 | 700            | 2. 488 | 500        | 3. 945 | 4. 419 | 5. 613 |
| 620    | 600            | 234    | ■■■        | 279    | 715    | 281    |
| 284    | Round to → 300 | 709    | ■■■        | 788    | 466    | 565    |
| 702    | 700            | 348    | ■■■        | 649    | 732    | 119    |
| + 566  | + 600          | + 709  | + ■■■      | + 541  | + 107  | + 449  |
|        | about ■■■■     |        | about ■■■■ |        |        |        |
- 
- |         |           |         |           |         |         |
|---------|-----------|---------|-----------|---------|---------|
| 6. 1580 | 1600      | 7. 1289 | ■■■■      | 8. 1750 | 9. 1903 |
| - 1105  | → - 1100  | - 1090  | - ■■■■    | - 1663  | - 1481  |
|         | about ■■■ |         | about ■■■ |         |         |

Watch the signs.

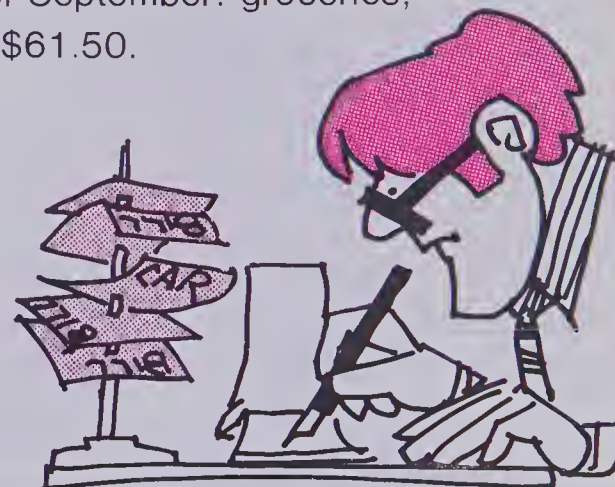
- |              |       |              |              |              |              |              |
|--------------|-------|--------------|--------------|--------------|--------------|--------------|
| 10. \$ 70.18 | \$ 70 | 11. \$ 41.65 | 12. \$ 95.83 | 13. \$ 42.21 | 14. \$ 34.32 | 15. \$ 43.71 |
| 81.43        | ■■    | 63.41        | - 36.54      | + 67.37      | 58.65        | - 27.09      |
| 26.24        | ■■    | 35.75        |              |              | 62.84        |              |
| + 53.65      | ■■    | + 41.88      |              |              | + 16.85      |              |
|              | \$■■■ |              |              |              |              |              |

# Estimation Stories

These are Mr. Periwinkle's major expenses for the month of September: groceries, \$279.84; rent, \$326; hydro, \$52.28; gasoline for his car, \$61.50.

About how much money will he need?

Actual		Estimate
\$279.84		\$280
326.00	Round	330
52.28	to	50
+ 61.50	→	+ 60
<hr/>		<hr/>
\$ ■■■.■■		\$ 720



He will need about \$720.

## Exercises

- At the Maple Lane Community Fair, the bakery stall made \$157.38, the book stall made \$26.13, the toys and games stall made \$30.94, and the home-preserves stall made \$49.85. About how much did these four stalls make?  
(Round to the nearest ten.)
- In Cedarbrae School there are 17 students in Kindergarten, 21 students in Grade 1, 29 students in Grade 2, 32 students in Grade 3, 36 students in Grade 4, 35 students in Grade 5, and 34 students in Grade 6.  
Round to the nearest ten to give an estimate of the total number of students in Cedarbrae School.
- On a trip out west, Mr. Schmidt travelled 412 km on the first day, 630 km on the second day, and 580 km on the third day.  
Round to the nearest hundred to give an estimate of the total number of kilometres Mr. Schmidt travelled on the three days.
- For Unicef, these collections were made:  
John, \$4.79; Jean, \$3.15; Suzette, \$6.22; and Jason, \$5.92.  
About how much did these four people collect?  
(Round to the nearest dollar.)



# Exploring Numbers

1. Find a pattern for each. Copy and complete.

(a) 20, 25, 20, 25, 20, 25, \_\_, \_\_, \_\_.

(b) 0.1, 0.3, 0.5, 0.7, \_\_, \_\_, \_\_.

(c) 1, 10, 19, 28, 37, 46, \_\_, \_\_, \_\_.

(d) 4.005, 4.105, 4.205, 4.305, \_\_, \_\_, \_\_.

(e) 3, 8, 11, 16, \_\_, 24, \_\_, 32, \_\_.

(f) 1, 2, 3, 2, 3, 4, 3, 4, 5, 4, 5, 6, \_\_, \_\_, \_\_.



2. Find the number.

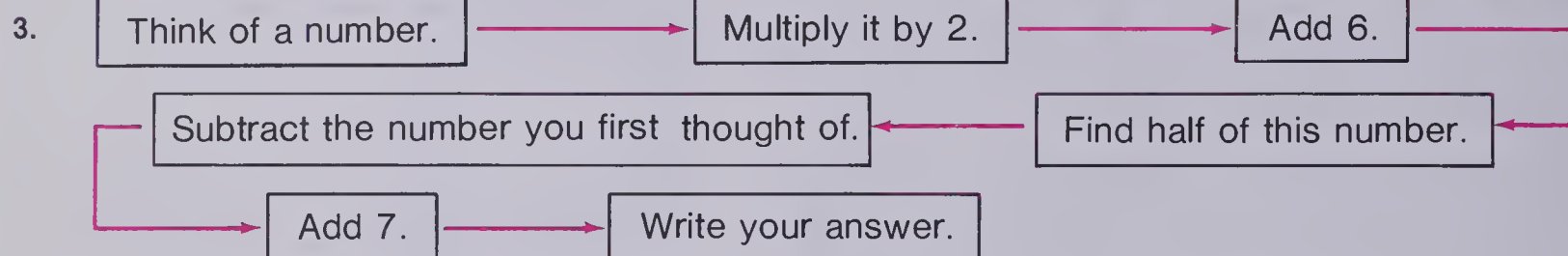
I am larger than 20 but smaller than 30.

I am not a multiple of 4.

I am an even number.

My digits are not the same.

What number am I?



Repeat, using different starting numbers. What answer do you always get?

4. Copy and find the unknown numbers.

(a)  $\blacksquare$  948

2  $\blacksquare$  67

5 98  $\blacksquare$

+ 4 7  $\blacksquare$  2

17 492

(b) 9 4  $\blacksquare$  5

6  $\blacksquare$  7  $\blacksquare$

4 305

+  $\blacksquare$  826

28 438

(c) 8  $\blacksquare$  24  $\blacksquare$

- 59  $\blacksquare$   $\blacksquare$  7

23 819

(d) 60  $\blacksquare$  2  $\blacksquare$

-  $\blacksquare$   $\blacksquare$  6  $\blacksquare$  2

23 747

5. John found that every even number larger than 2 can be written as the sum of 2 prime numbers:

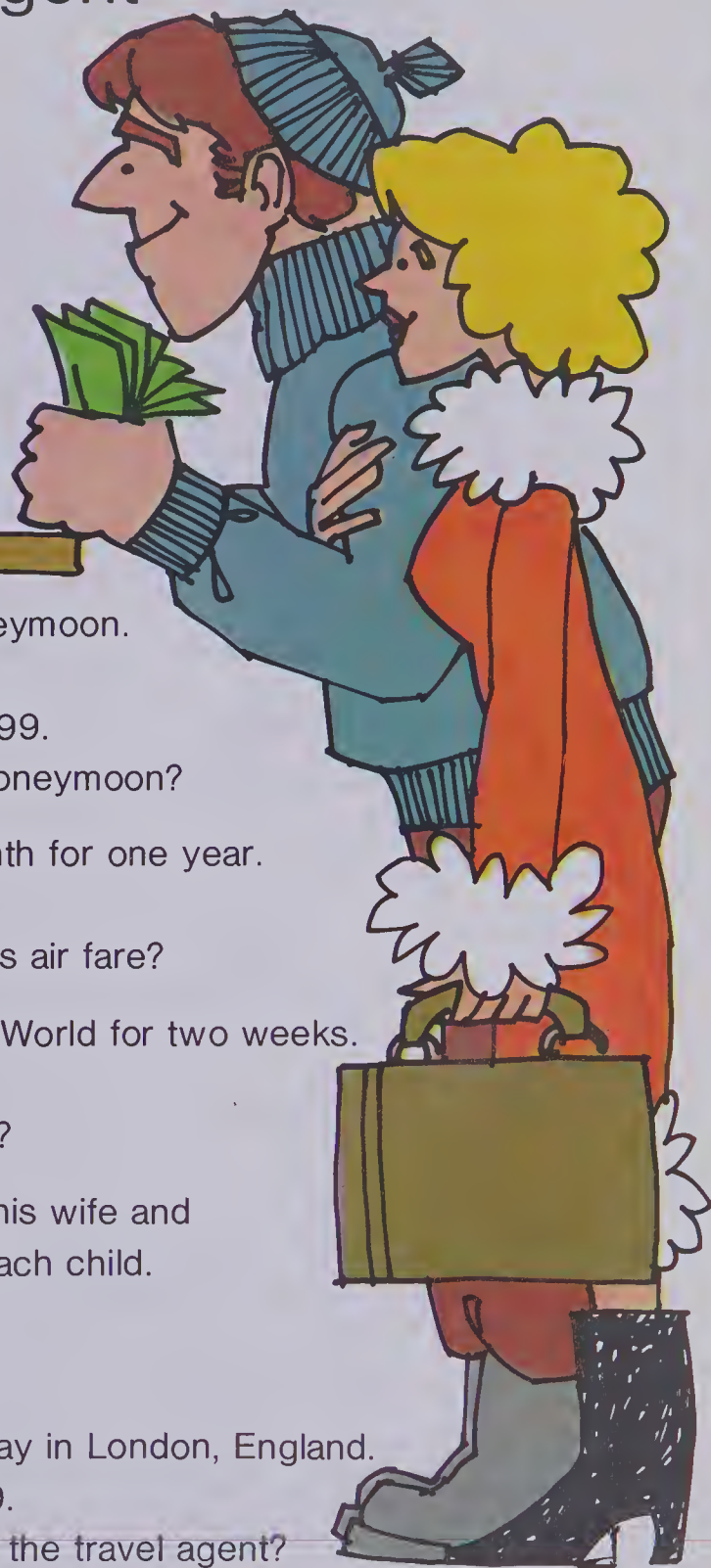
$$4 = 2 + 2$$

$$6 = 3 + 3$$

$$8 = 3 + 5,$$

Check John's discovery for all of the even numbers up to 30.

# The Travel Agent

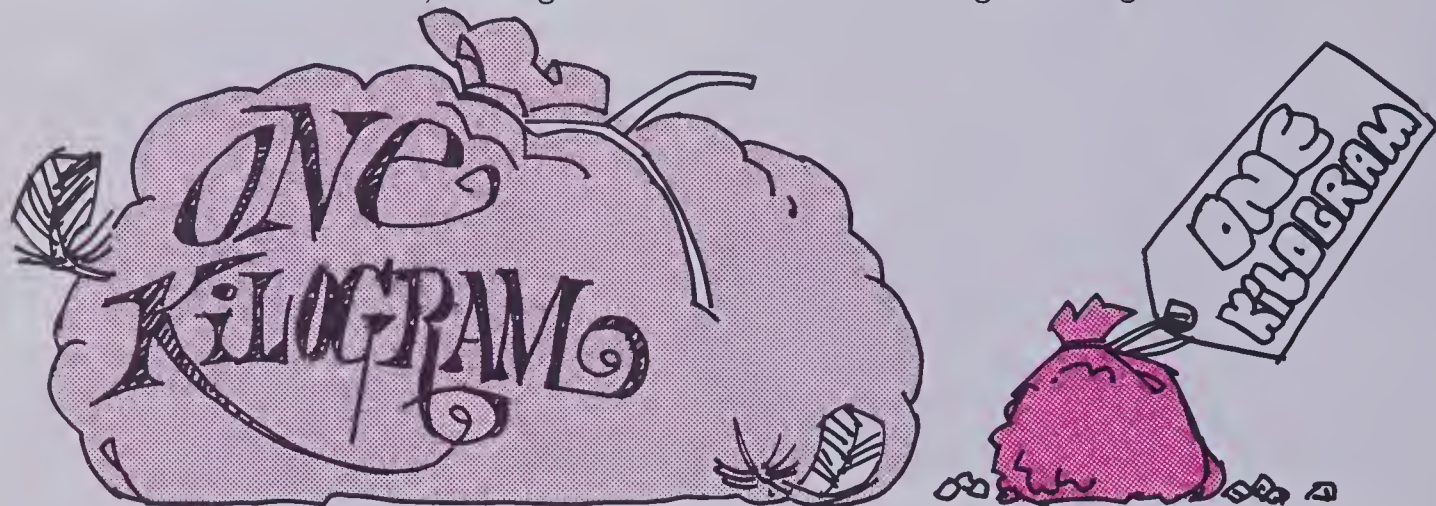


1. Mr. and Mrs. Bertram went to Nassau for their honeymoon.  
Their air fare plus hotel was \$1018.  
Their meal plan was \$240. They rented a car for \$99.  
How much did they pay the travel agent for their honeymoon?
2. Mr. Brown flew to Calgary on business once a month for one year.  
The round trip was \$350.  
How much a year did he pay the travel agent for his air fare?
3. Fifteen girl guides and two leaders went to Disney World for two weeks.  
The cost per person for one week was \$315.  
How much did they pay the travel agent altogether?
4. Mr. Samson booked a charter trip to Barbados for his wife and two children. He paid a special rate of \$219 for each child.  
He paid \$359 each for himself and his wife.  
How much did he pay the travel agent for his trip?
5. Miss Simpson saved \$2500 for a three-week holiday in London, England.  
Her charter air fare was \$359. Her hotel was \$950.  
She rented a car for \$289. How much did she pay the travel agent?  
How much money did she have left to spend?



# Number Sentences

Riddle: Which has more mass, a kilogram of feathers or a kilogram of gravel?



Answer: Neither. They are equal because they have the same mass — 1 kg.

The symbol for equal is  $=$ .

We can write a number sentence:  $8 = 4 + 4$ .

We say “8 equals 4 plus 4.”

The symbol for not equal is  $\neq$ .

We can write a number sentence:  $8 \neq 4 + 3$ .

We say “8 is not equal to 4 plus 3.”

## Exercises

1. Use  $=$  or  $\neq$  to make each number sentence true.

(a)  $7 + 5 \bullet 13$

(c)  $4 + 4 + 4 \bullet 11$

(e)  $32 - 10 \bullet 20$

(g)  $6 \times 0 \bullet 6 + 0$

(i)  $\$1.00 \bullet 50 \text{ cents} + 50 \text{ cents}$

(k)  $64 \div 8 \bullet 8$

(m)  $27 \div 9 \bullet 1 + 1 + 1$

(o)  $18 + 3 + 7 \bullet 7 + 3 + 18$

(q)  $7 \times 5 + 8 - 5 \bullet 7 \times 13 - 5$

(s)  $\$10.00 - \$7.25 \bullet \$2.75$

(u)  $6 + 5 \times 5 \bullet 6 + 25$

(b)  $3 \times 5 \bullet 15$

(d)  $9 \times 9 \bullet 81$

(f)  $5 + 3 \bullet 3 + 5$

(h)  $1 \times 1 \bullet 1 \times 0$

(j)  $20 + 30 \bullet 40 + 10$

(l)  $(2 \times 3) - 5 \bullet 6 - 5$

(n)  $100 - 75 \bullet 3 \times 8$

(p)  $(3 \times 3) + 1 \bullet (3 \times 1) + 3$

(r)  $3 + 5 \times 4 \bullet 8 \times 4$

(t)  $999\,999 + 1 \bullet 1\,000\,000$

(v)  $56 \div 7 - 3 \bullet 56 \div 4$

Hint:  
Do the operation  
in brackets  
first.



# Solving Equations

Solve these equations by finding the correct number for  $n$ .

$$n - 8 = 11$$

You know that

$$11 + 8 = 19.$$

Use 19 in place of  $n$ .

$$19 - 8 = 11$$

$$n = 19$$

It works!

$$n + 5 = 12$$

You know that

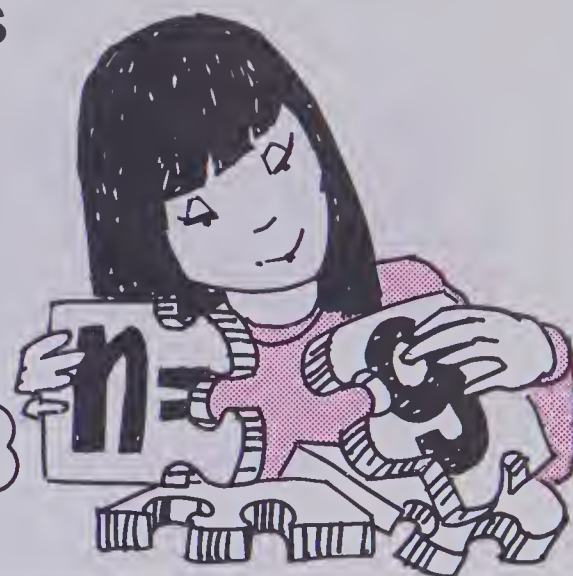
$$12 - 5 = 7.$$

Use 7 in place of  $n$ .

$$7 + 5 = 12$$

$$n = 7$$

It works!



Using the opposite related equation helps solve for  $n$ .

## Exercises

Solve these equations.

1. (a)  $n - 5 = 12$

$$12 + 5 = \blacksquare$$

$$\blacksquare - 5 = 12$$

$$n = \blacksquare$$

(b)  $n - 9 = 15$

$$\blacksquare + \blacksquare = \blacksquare$$

$$n = \blacksquare$$

(c)  $n - 7 = 11$

(d)  $n - 11 = 19$

(e)  $n - 0 = 12$

2. (a)  $n + 4 = 16$

$$16 - 4 = \blacksquare$$

$$\blacksquare + 4 = 16$$

$$n = \blacksquare$$

(b)  $n + 7 = 15$

$$\blacksquare - \blacksquare = \blacksquare$$

$$n = \blacksquare$$

(c)  $n + 5 = 11$

(d)  $n + 11 = 24$

(e)  $7 + n = 15$

3. Solve.

(a)  $n + 7 = 9$

(e)  $n - 35 = 17$

(b)  $n - 8 = 10$

(f)  $29 + n = 63$

(c)  $n + 13 = 15$

(g)  $n - 50 = 34$

(d)  $26 + n = 52$

(h)  $n - 16 = 41$

4. Solve.

(a)  $\$2.50 + n = \$3.50$

(d)  $n - 7.3 = 8.7$

(b)  $\$12.75 + n = \$25.15$

(e)  $n - 13.7 = 8.3$

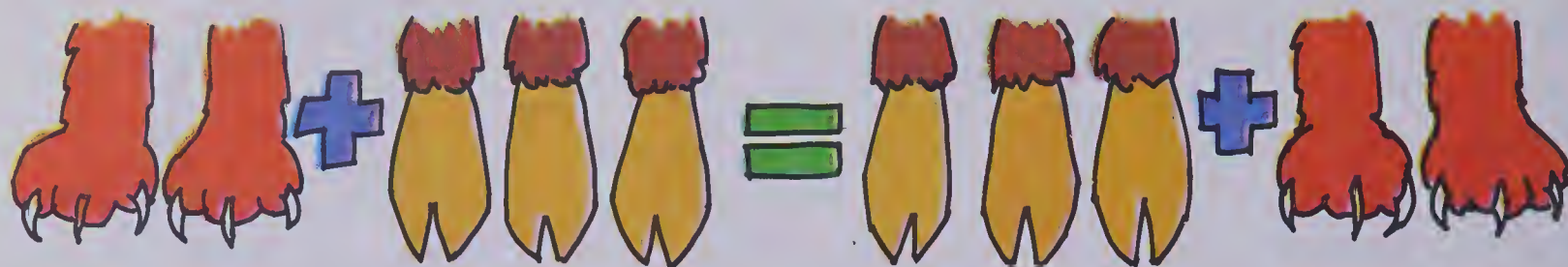
(c)  $n + \$29.50 = \$100.00$

(f)  $n - 45.26 = 26.41$

★ 5.  $14 - n = 6$

★ 6.  $33 - n = 19$

# Properties of Addition



When you add, you can change the order of the addends.

The sum remains the same:

$$2 + 3 = 3 + 2$$



When you add, you can change the grouping of the addends.

The sum remains the same:

$$(2 + 3) + 4 = 2 + (3 + 4)$$

## Exercises

1. Solve the following, using addition properties.

(a)  $5 + 6 = 6 + a$

(c)  $b + 37 = 37 + 7$

(e)  $50 + a = 20 + 50$

(g)  $a + 16 = 16 + 43$

(i)  $14 + 33 = b + 14$

(k)  $(5 + 2) + 3 = 5 + (2 + a)$

(m)  $(9 + 4) + 5 = 9 + (4 + b)$

(o)  $(8 + 7) + a = 8 + (7 + 4)$

★ (q)  $(5 + 14) + a = b + (14 + 3)$

(b)  $17 + 19 = 19 + a$

(d)  $a + 23 = 23 + 5$

(f)  $72 + b = 36 + 72$

(h)  $22 + b = 51 + 22$

(j)  $36 + 12 = b + 12$

(l)  $(6 + 2) + 4 = 6 + (2 + b)$

(n)  $(7 + a) + 2 = 7 + (1 + 2)$

(p)  $(a + 11) + 6 = 43 + (11 + 6)$

★ (r)  $(a + 17) + 1 = 2 + (b + 1)$

Hint:  
Do the operations  
in brackets  
first.

2. Solve the following without computing.

- (a)  $(0.3 + 0.7) + 0.4 = 0.3 + (0.7 + a)$
- (b)  $(9.1 + 5.0) + 0.7 = 9.1 + (5.0 + b)$
- (c)  $(0.121 + 1.3) + 16 = 0.121 + (a + 16)$
- (d)  $(\$1.05 + \$1.75) + \$3.20 = \$1.05 + (b + \$3.20)$
- (e)  $(\$18.50 + \$3.21) + \$0.90 = \$18.50 + (\$3.21 + a)$
- (f)  $(2613 + 114) + 1567 = 2613 + (114 + b)$
- (g)  $(9 + 19) + 3 = (9 + a) + 19$
- (h)  $13 + (27 + 5) = (13 + b) + 27$

3. We can change the order to make our adding easier.

$(9 + 5) + 1$  can be changed to  $(9 + 1) + 5$ .

Change the order to make your adding easier.

- |                    |                    |                    |
|--------------------|--------------------|--------------------|
| (a) $4 + 20 + 6$   | (b) $27 + 8 + 3$   | (c) $8 + 13 + 2$   |
| (d) $5 + 13 + 25$  | (e) $7 + 19 + 13$  | (f) $12 + 69 + 8$  |
| (g) $37 + 22 + 3$  | (h) $4 + 76 + 16$  | (i) $9 + 35 + 41$  |
| (j) $25 + 27 + 25$ | (k) $50 + 98 + 50$ | (l) $40 + 63 + 60$ |



## BRAINTICKLER

Each question has 5 blanks. The missing digits are 2, 3, 4, 5, 8.  
Find the correct order.

A. 1332

$\times$  ■

■■■■

B. ■■■■

$\times$  ■

13 032

C. ■■■■

$\times$  ■

41 872




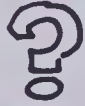


# Problems

The drive from Acadia Park to the Lewis home is 87.4 km.

The family stopped for gas after 36.6 km. How much farther must they go to get home?

Follow Professor Q's steps.

Step 1 Answer these four questions:

Questions	Answers
 1. What is the main idea?	→ Driving home
 2. What is being asked?	→ How much farther to go?
 3. What are the facts?	→ 87.4 km in all to go. Have gone 36.6 km.
 4. Which operation do I use?	→ Subtraction

Step 2 Write a number sentence.

$$87.4 - 36.6 = n$$

Step 3 Make the sentence true.

$$87.4 - 36.6 = 50.8$$

Step 4 Write a final statement.

They must go 50.8 km farther to get home.



## Exercises

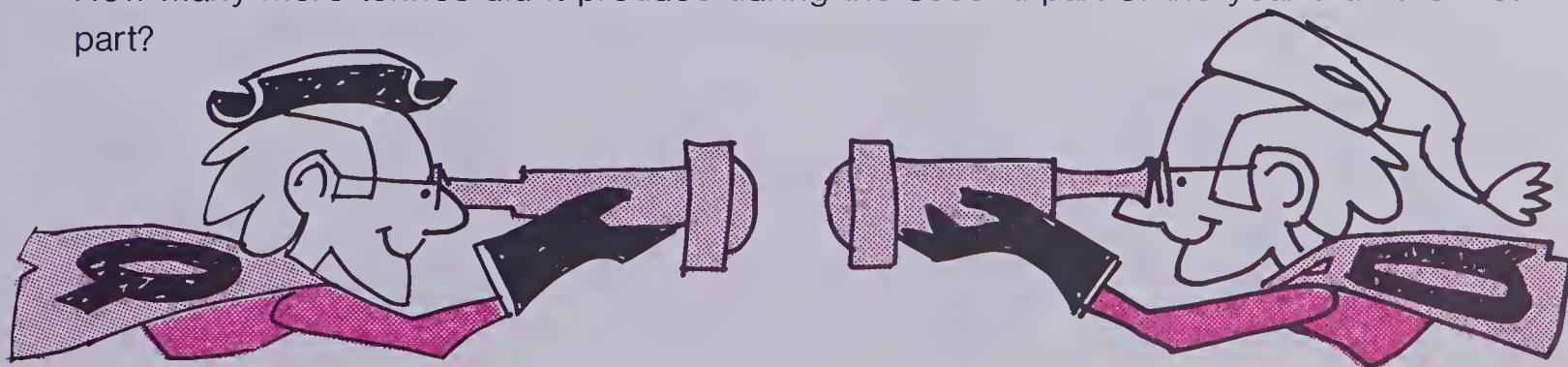
Follow Professor Q's steps to solve these problems.

1. Manfred's mother asked him to go to the store.

He ran to the store in 6.8 min and walked back from the store in 12.75 min.

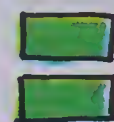
How much longer did he take to come back from the store than to go there?

2. Mr. Murphy grew 3 fields of potatoes. The yield in the first field was 3.5 t. The yield in the second field was 2.75 t, and the yield in the third field was 3.25 t.  
How many tonnes of potatoes did his fields yield?
3. Rosa guessed that Luigi's mass was 37 kg. Luigi's mass was actually 34.6 kg.  
How many kilograms less was Luigi's mass than Rosa's guess?
4. The neighbourhood club got together to make paper chains to decorate the clubhouse for a party. Sam's chain was 546 cm long. Selma's chain was 684 cm long.  
Ali's chain was 857 cm long. Jennie's chain was 783 cm long. Conrad's chain was 945 cm long.  
What was the total length of their chains?
5. In 1900 the population of Loganville was 1 287 385. In 1980 the population was 3 786 432.  
How many more people were there in 1980 than in 1900?
6. The Grade 6 class in Greenacres School held a penny-collecting drive for charity. Justin collected 468 pennies. Lizzie collected 478 pennies. Tiffany collected 682 pennies. Jim collected 387 pennies.  
How many pennies did they collect altogether? Write this amount in dollars.
7. Christopher Columbus discovered the New World in 1492.  
Jacques Cartier discovered the St. Lawrence River in 1535.  
How many years was that after Columbus discovered the New World?
8. A steel mill turned out 1 376 000 t of steel during the first part of the year.  
Its output during the second part of the year was 1 559 500 t of steel.  
How many more tonnes did it produce during the second part of the year than the first part?

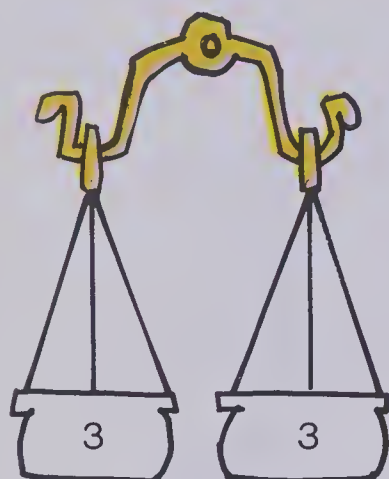




## Symbols

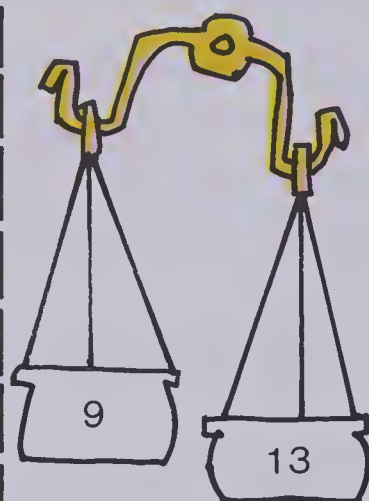


Using symbols helps save time and space.



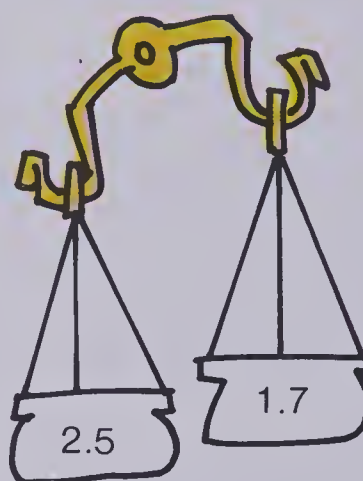
3 is equal to 3

$$3 = 3$$



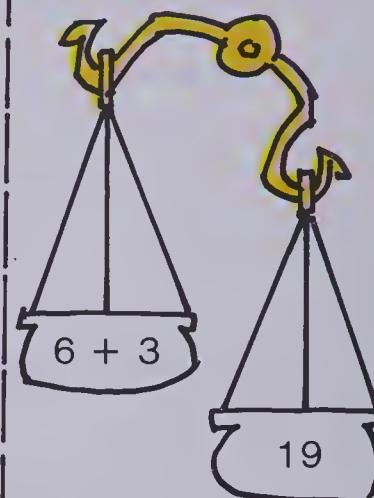
9 is not equal to 13

$$9 \neq 13$$



2.5 is greater than 1.7

$$2.5 > 1.7$$



6 + 3 is less than 19

$$6 + 3 < 19$$

### Exercises

1. Read these statements.

(a)  $23 = 23$

(b)  $10 + 6 = 16$

(c)  $15 - 6 \neq 8$

(d)  $1.7 < 7.1$

(e)  $1001 > 101$

(f)  $\$11.53 \neq \$10.99$

(g)  $0.6 - 0.4 = 0.2$

(h)  $\$2.50 + \$2.50 < \$6.00$

(i)  $1000 > 0.1000$

(j)  $58 + 6 \neq 74$

(k)  $58 + 6 < 74$

(l)  $121.3 > 12.13$

(m)  $12.13 < 121.3$

(n)  $\$9.63 + \$2.00 \neq \$10.63$

(o)  $\$9.63 + \$2.00 > \$10.63$

2. Are these statements correct? Write True or False.

(a)  $14 = 14$

(b)  $6.5 < 5.6$

(c)  $5 + 6 \neq 11$

(d)  $15 - 6 > 9$

(e)  $12.9 + 1.1 > 14.0$

(f)  $0.8 + 0.1 = 0.9$

(g)  $6 + 3 = 6.3$

(h)  $24.7153 > 25.0$

(i)  $0.319 > 0.289$

(j)  $23.6 + 1.0 \neq 25.6$

(k)  $23.6 + 1.0 < 25.6$

(l)  $23.6 + 1.0 = 25.6$



3. Copy and complete using = or  $\neq$ .

(a)  $11 \bullet 7$

(d)  $14 \bullet 14$

(g)  $66 \bullet 85$

(j)  $116 \bullet 134$

(b)  $18 \bullet 24$

(e)  $295 \bullet 360$

(h)  $90 \bullet 90.0$

(k)  $7.9 \bullet 7.90$

(c)  $27 \bullet 13$

(f)  $54 \bullet 72$

(i)  $102 \bullet 120$

(l)  $\$0.25 \bullet 25\text{¢}$

4. Copy and complete using  $>$  or  $<$ .

(a)  $18 \bullet 13$

(d)  $79 \bullet 36$

(g)  $27 \bullet 2.7$

(j)  $8100 \bullet 81\ 000$

(b)  $25 \bullet 17$

(e)  $185 \bullet 851$

(h)  $35 \bullet 0.35$

(k)  $\$13.00 \bullet \$15.00$

(c)  $67 \bullet 68$

(f)  $127 \bullet 137$

(i)  $1127 \bullet 113.0$

(l)  $1.49 \bullet 1.490$

5. Use =,  $>$ , or  $<$  to make each statement true.

(a)  $36 \bullet 63$

(d)  $18.1 \bullet 18.10$

(g)  $8 + 8 \bullet 24$

(b)  $5 + 8 \bullet 13$

(e)  $10 - 3 \bullet 3$

(h)  $7 + 9 \bullet 27$

(c)  $8 + 5 \bullet 26$

(f)  $12 - 6 \bullet 19$

(i)  $5 + 7 \bullet 12$

6. Copy and complete using =,  $>$ , or  $<$ .

(a)  $28 \bullet 27 + 1$

(d)  $16.5 \bullet 1.5 + 5.1$

(g)  $43 \bullet 21.1 + 21.9$

(b)  $52 \bullet 52.0$

(e)  $4.7 \bullet 7.3 - 2.6$

(h)  $72 \bullet 100 - 28$

(c)  $890 \bullet 891$

(f)  $31 \bullet 18 + 12$

(i)  $0.26 \bullet 0.2 + 0.05$

7. Copy and complete using =,  $>$ , or  $<$ .

(a)  $20 + 70 \bullet 90$

(d)  $24 - 3 \bullet 19$

(g)  $9 \times 3 \bullet 27$

(b)  $1.6 \times 3.0 \bullet 1.92$

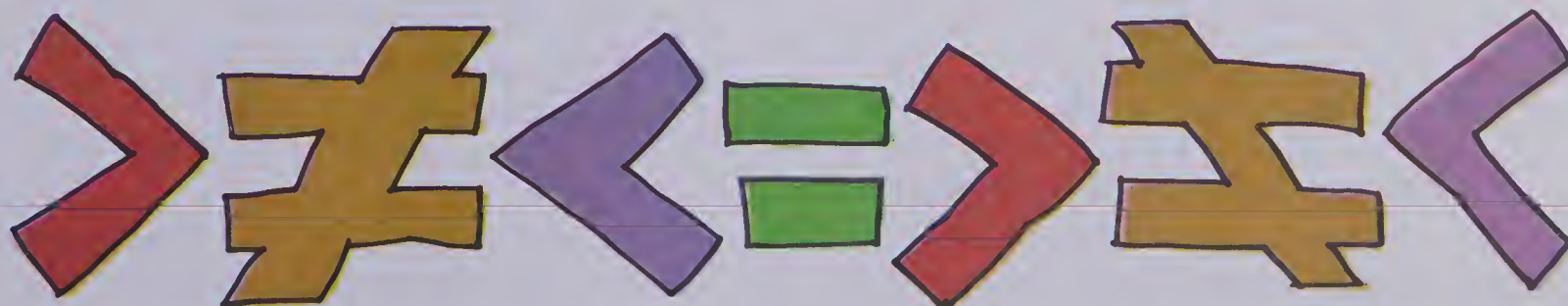
(e)  $2 + 3 + 5 \bullet 10$

(h)  $111 \bullet 111.1$

(c)  $\$2.31 + \$2.31 \bullet \$4.63$

(f)  $7.2 - 1.9 \bullet 7.0$

(i)  $3.2 + 0.7 \bullet 3.9$



# Let's Compare

6824 and 6859

6	8	2	4
↑	↑	↑	
same	same	less	
↓	↓		
6	8	5	9

$6824 < 6859$

2130 and 916

2	1	3	0
↑			
more			

	9	1	6
--	---	---	---

$2130 > 916$

17 685.274 and 17 685.131

1	7	6	8	5	•	2	7	4
↑	↑	↑	↑	↑		↑		
same	same	same	same	same		more		
↓	↓	↓	↓	↓				
1	7	6	8	5	•	1	3	1

$17\ 685.274 > 17\ 685.131$

## Exercises

1. Compare. Use =, <, or >.

(a) 379.48 and 379.67

3	7	9	.	4	8
↑	↑	↑		↑	

3	7	9	.	6	7
---	---	---	---	---	---

$379.48 \bullet 379.67$

(b) 2768.5 and 2758.6

2	7	6	8	.	5
		↑			

2	7	5	8	.	6
---	---	---	---	---	---

$2768.5 \bullet 2758.6$

(c) 149.37 • 49.51

(e) 884 • 8837

(g) 18 497 • 13 845

(i) 559.26 • 559.26

(k) 16.347 • 16.343

(m) 732 564 • 732 564

★ (o) 767 254.6 • 945 999

(d) 324.68 • 321.78

(f) \$68.75 • \$68.75

(h) 26 483.27 • 26 417.36

(j) \$649.17 • \$6499.17

(l) 5000.165 • 4000.165

(n) 17 643 561 • 17 654 321

★ (p) 9 999 999 • 10 000 000

2. Arrange each set in order from smallest to largest.

(a) 33.9, 34.4, 43.1, 33.2, 32.6

(b) 167.5, 176.5, 167.7, 157.6, 165.7

(c) 12.35, 12.37, 12.45, 12.47, 12.37

(d) 26.375, 26.573, 26.753, 26.357

# Chapter Test

1. (a) 
$$\begin{array}{r} 8347 \\ 483 \\ 2768 \\ + 4403 \\ \hline \end{array}$$
 (b) 
$$\begin{array}{r} \$123.95 \\ 43.06 \\ 385.79 \\ + 426.38 \\ \hline \end{array}$$
2. (a) 
$$\begin{array}{r} 70\ 000 \\ - 38\ 564 \\ \hline \end{array}$$
 (b) 
$$\begin{array}{r} \$4832.36 \\ - 709.47 \\ \hline \end{array}$$
3. Write a number sentence and solve it to answer this problem:  
Marvin has \$8.70. He wants to buy a skateboard that costs \$19.50. How much more does he need?
4. (a)  $10.7683 + 5.37 + 0.8521 + 2.765$  (b)  $302.856 - 0.3401$
5. Write in numerals.  
(a) two million, two hundred fifty-five thousand, four hundred ten  
(b) ten billion (c) thirty-five billion, seven hundred million
6. Write in words.  
(a) 12 700 346 (b) 84 000 000 000 (c) 7 350 000 000
7. Write as decimals.  
(a)  $17\frac{3}{10}$  (b)  $857\frac{19}{1000}$
8. Write as fractions.  
(a) 300.81 (b) 18.511
9. Write the place value of each underlined digit.  
(a) 3 476.853 (b) 46 842.35 (c) 9 347 852 901 (d) 5.1163
10. Round off as indicated.  
(a) 7832 (nearest 1000) (b) 527 (nearest 100) (c) 82 500 (nearest 10 000)  
(d) 45.6 (whole number) (e) 63.584 (hundredth) (f) 181.18 (tenth)
11. The town of Hampton elected a new mayor. Mr. Meadows got 4837 votes. Ms. Klein got 3424 votes. Ms. Foley got 341 votes. Mr. Gauthier got 555. Round to the nearest hundred to estimate how many people voted altogether.
12. Copy and complete using =, >, or <.  
(a)  $28.7 \bullet 28.70$  (b)  $19 \bullet 20 - 1$  (c)  $7.5 + 9.5 \bullet 13.75$   
(d)  $\$25.30 \bullet \$12.40 + \$12.90$  (e)  $487 \bullet 48.71$  (f)  $8\ 531\ 332 \bullet 8\ 532\ 332$
13. Solve.  
(a)  $n + 21 = 36$  (b)  $n - 14 = 23$  (c)  $n - 7.3 = 10.0$   
(d)  $(15 + 3) + 12 = 15 + (3 + a)$  (e)  $2.3 + 5.10 = 5.10 + a$



# Chapter 2

# Geometry

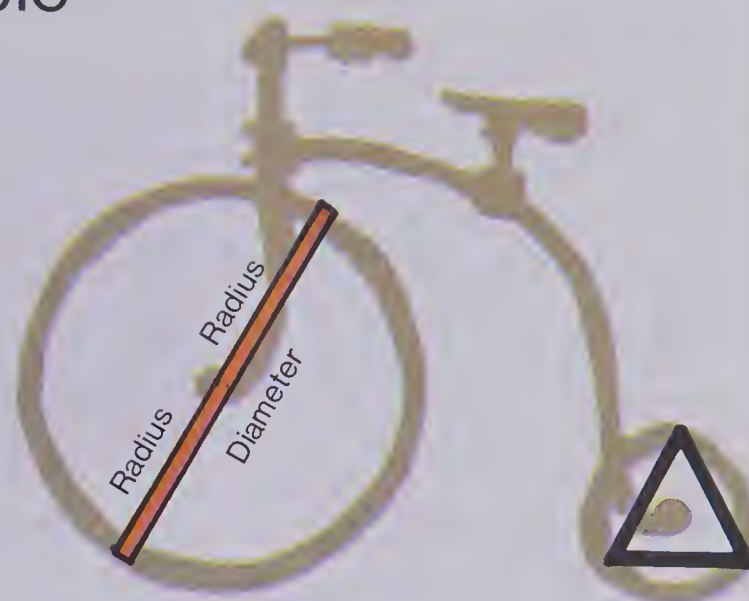
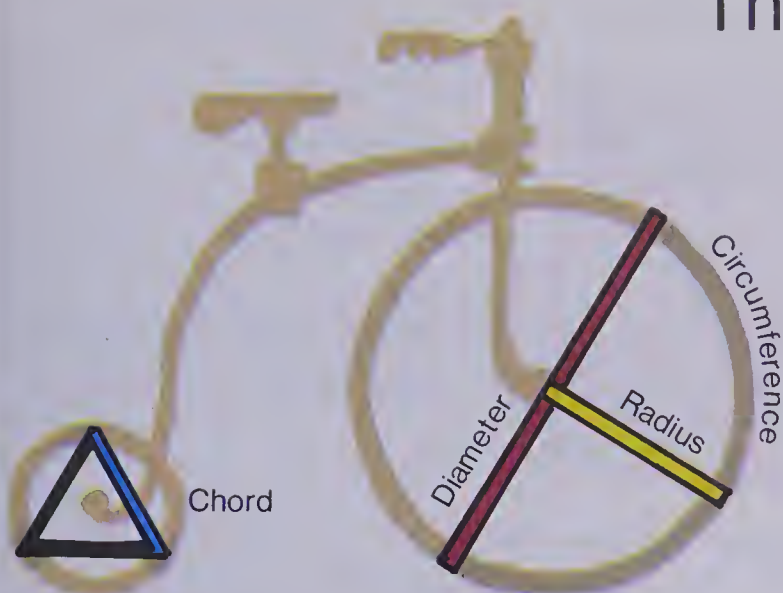
Shapes

Angles

Lines



# The Circle

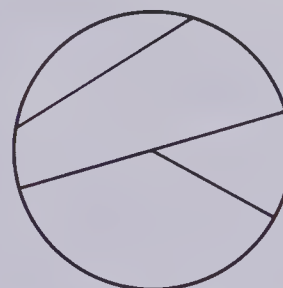


$$2 \text{ radii} = 1 \text{ diameter}$$

## Exercises

1. Draw this figure.

Label: radius, diameter, chord, circumference



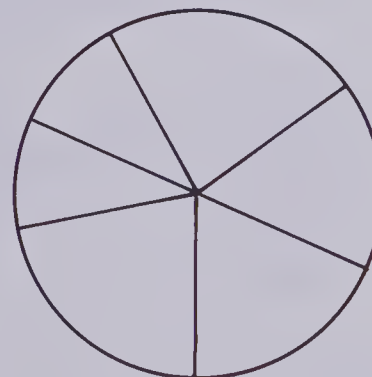
Measure each radius in the circles below.

What do you notice about the length of each radius of a circle?

2.



3.



4. Draw circles having the following radii.

(a) 3 cm

(b) 5 cm

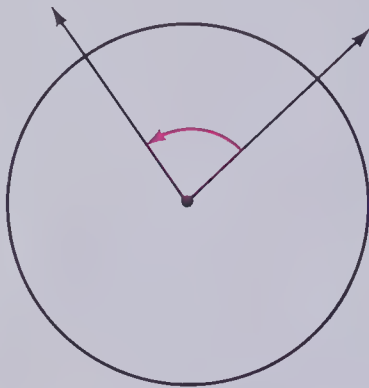
(c) 7 cm

5. Draw the diameters for each of the above.

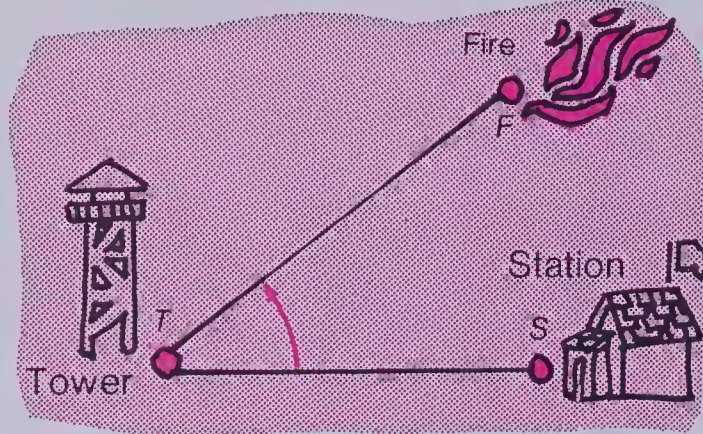
6. Compare the length of the radius and the diameter of each circle in Exercise 4.



# Naming Angles



An angle is formed by a rotating ray.

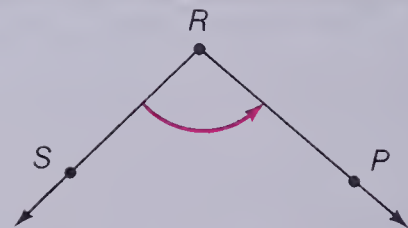


The fire lookout observer sighted the station. He then sighted the fire. The two lines of sight form a model of an angle.

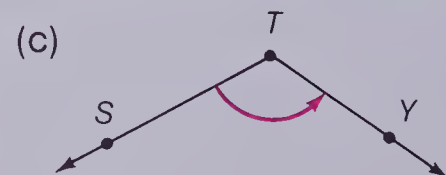
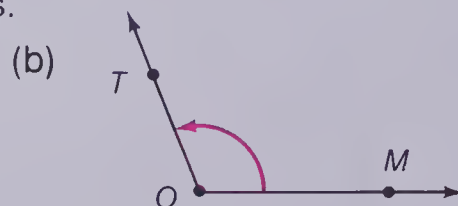
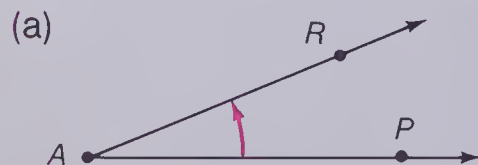
Some angle language: Vertex: point  $T$   
 Symbol for angle:  $\angle$   
 Names:  $\angle FTS$ ,  $\angle STF$ , or  $\angle T$   
 Sides: ray  $TS$  and ray  $TF$

## Exercises

1. Copy this angle.
  - (a) Name the vertex.
  - (b) Name each ray.
  - (c) Name the angle three ways, using the symbol  $\angle$ .
2. Draw an angle.
  - (a) Label the vertex  $M$ .
  - (b) Mark and label a point  $N$  on one ray.
  - (c) Mark and label a point  $P$  on the other ray.
  - (d) Name each ray.
  - (e) Name the angle three ways.

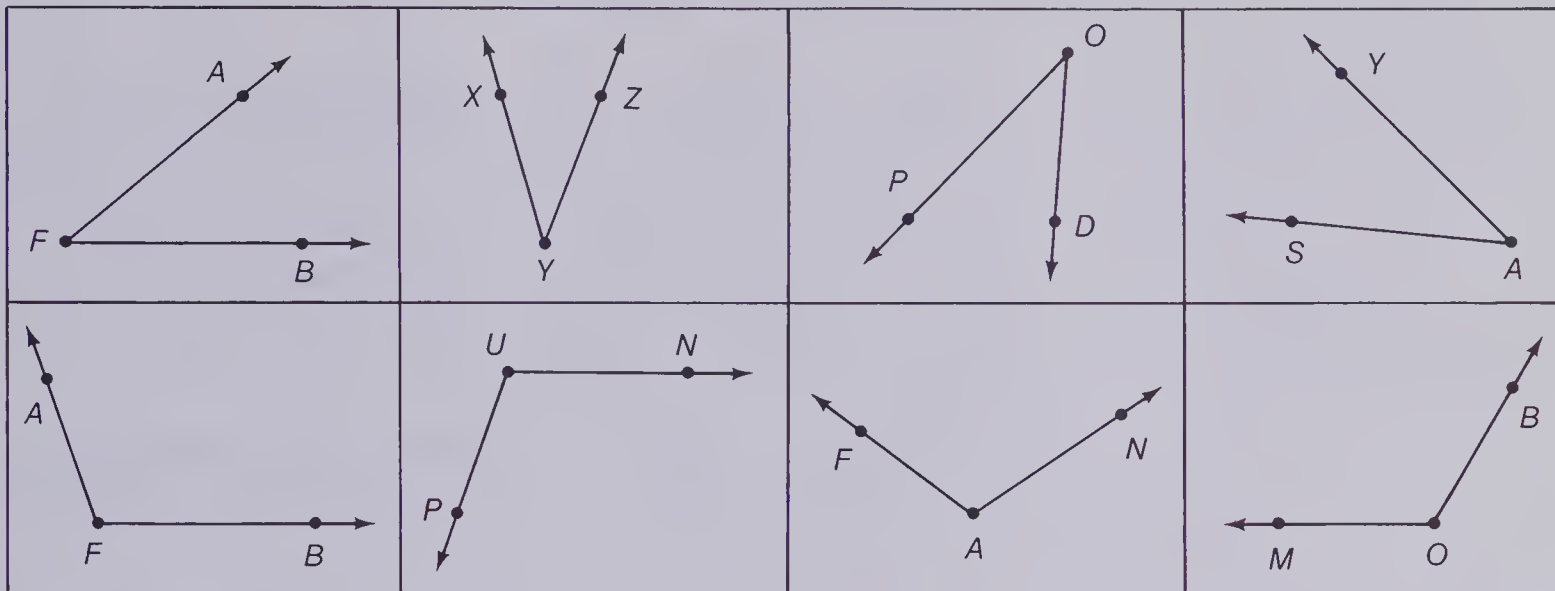


3. Name each angle three ways.

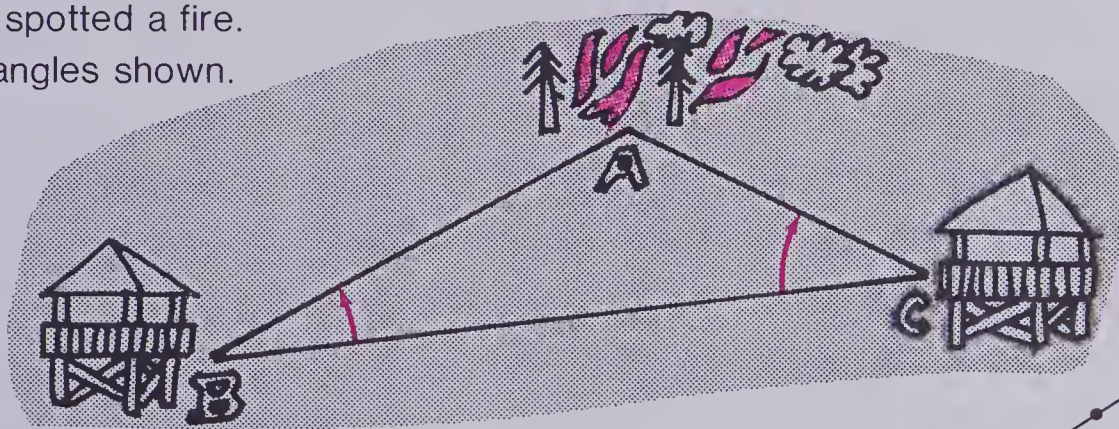




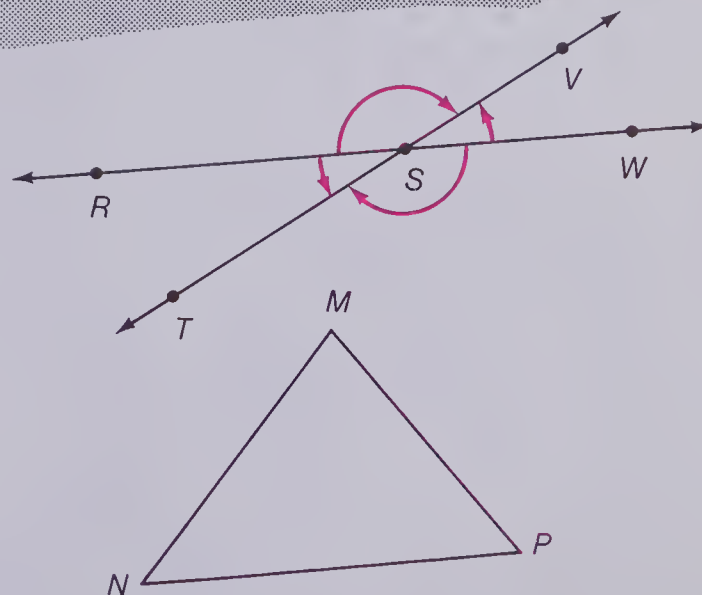
4. Use tracing paper. Which angles are congruent to  $\angle AFB$ ?



5. Two observers spotted a fire.  
Name the two angles shown.

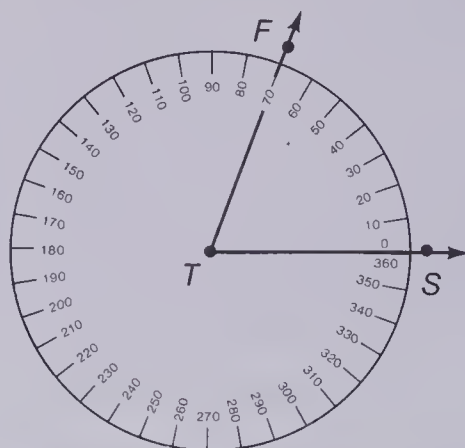


6. (a) Why is it not suitable to name  $\angle RST$  simply  $\angle S$ ?
- (b) Name each of the four angles shown.
- (c) Which angles are largest?
7. (a) Is it enough to name each angle of this triangle in this manner:  
 $\angle M$ ,  $\angle N$ , and  $\angle P$ ? Explain.
- (b) Name each angle another way.



# Measuring Angles I

The measure of  $\angle FTS$  is  $70^\circ$ .



Mathematicians use the **degree** as a unit of measure.

A circle is divided into 360 equal parts.  
Each part is called one degree.

There are  $360^\circ$  (degrees) in one circle.

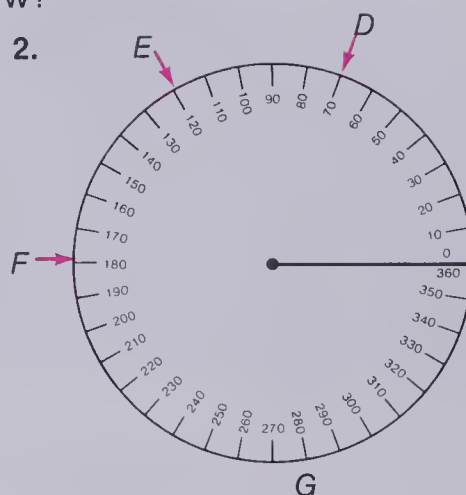
## Exercises

What is the reading at each arrow?

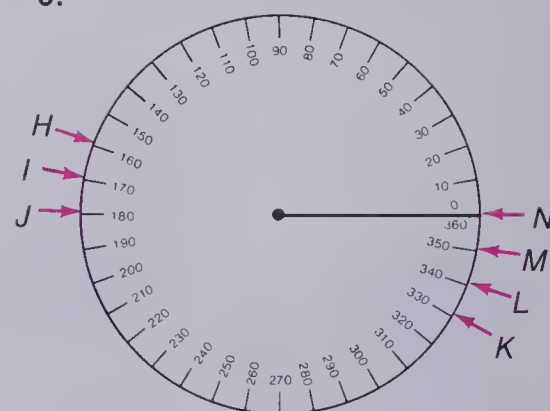
1.



2.



3.

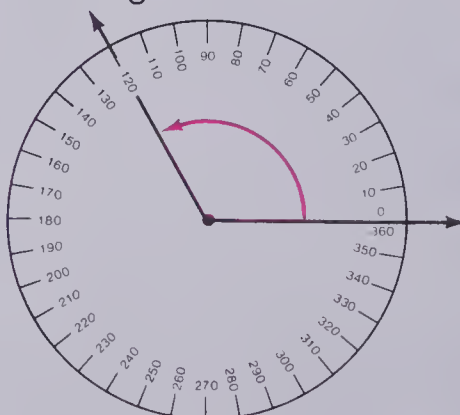


What is the measure in degrees of each angle?

4.



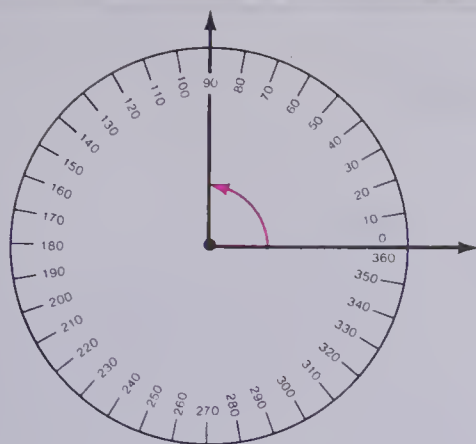
5.



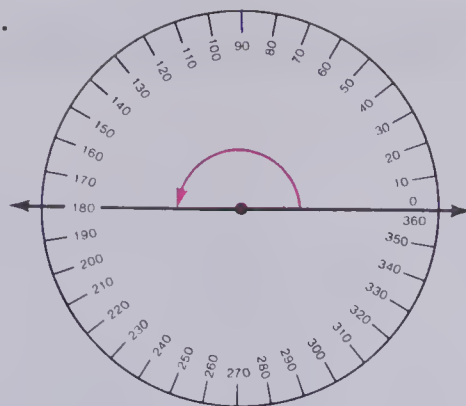
6.



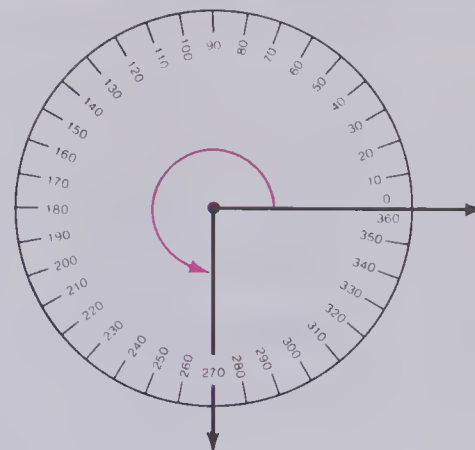
7.



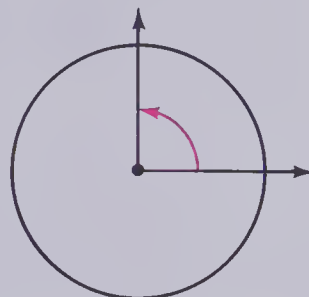
8.



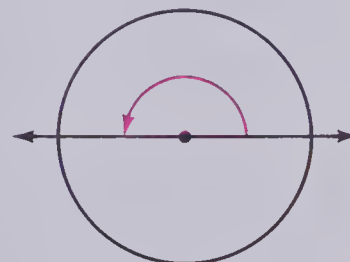
9.



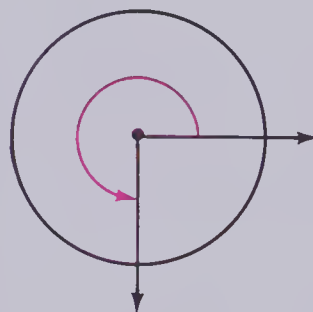
10. A ray rotates  $\frac{1}{4}$  of a full turn.  
How many degrees?



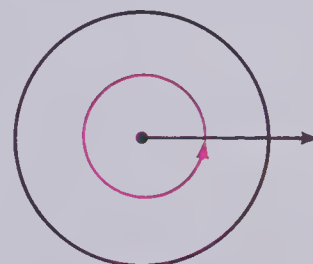
11. A ray rotates  $\frac{1}{2}$  of a full turn.  
How many degrees?



12. A ray rotates  $\frac{3}{4}$  of a full turn.  
How many degrees?



13. A ray rotates one full turn.  
How many degrees?



14. Draw and cut out a full circle.

Fold it in half.

Fold in half again.

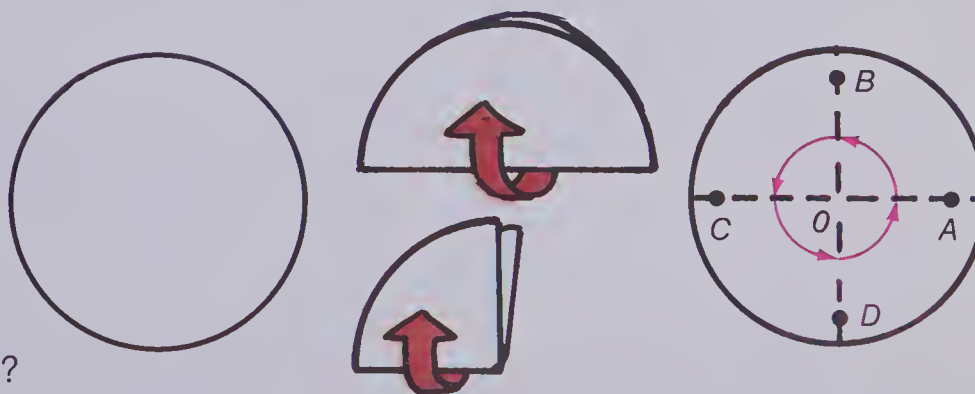
Open and mark the fold lines.

Label as shown.

What is the measure of  $\angle AOB$ ?

$\angle BOC$ ?  $\angle COD$ ?  $\angle DOA$ ?

What is the sum of all four angles?



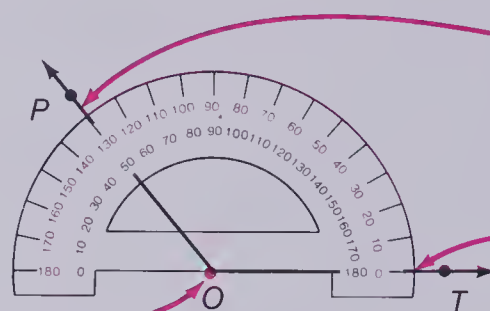


# The Protractor

This is a **protractor**.  
It is one half of a circle.  
It has two scales.  
We use a protractor to measure angles.

## Step 1

Place the centre of the protractor on the vertex of the angle.



## Step 3

Count from  $0^\circ$  to find the angle measure.

$\angle TOP$  measures  $130^\circ$ .

$\angle TOP = 130^\circ$

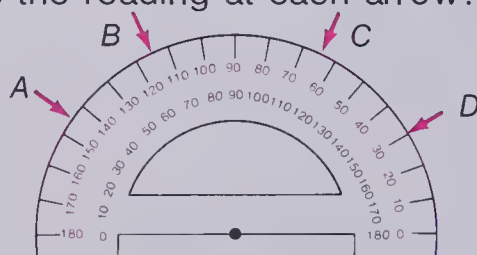
## Step 2

Adjust  $0^\circ$  along one ray.

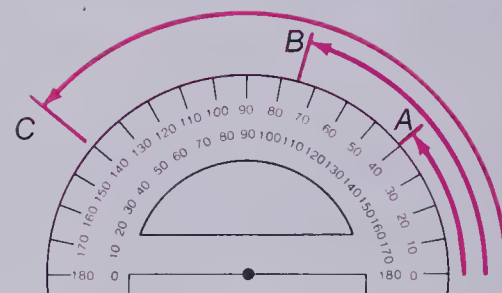
## Exercises

What is the reading at each arrow?

1.

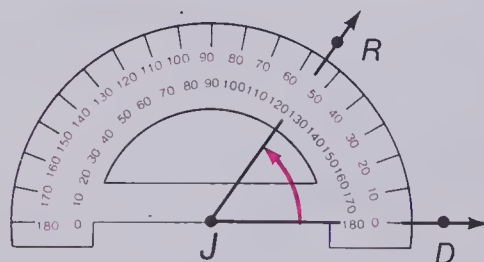


2.



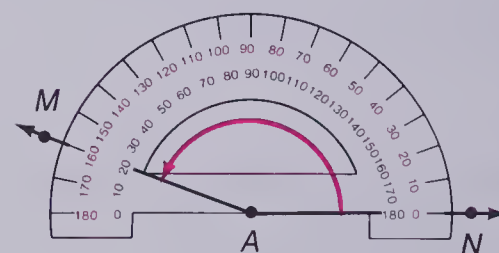
What is the measure of each angle?

3.



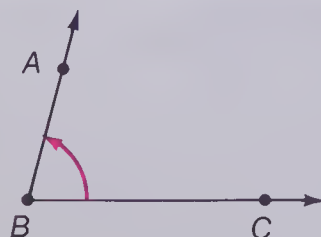
4.

Hint! Use outside scale.

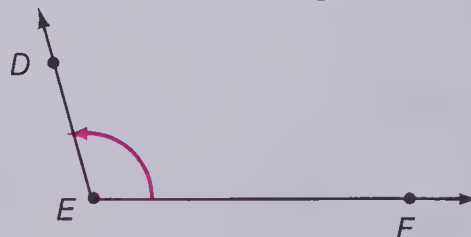


Use your protractor. What is the measure of each angle?

5.



6.



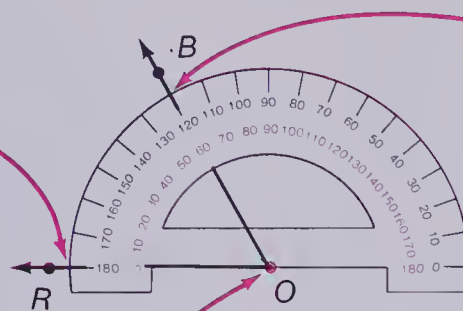
7.



# Measuring Angles II

Step 2

Adjust  $0^\circ$  along one ray.



Step 3

Count from  $0^\circ$  on the inner scale.

$\angle ROB$  measures  $60^\circ$ .

$\angle ROB = 60^\circ$

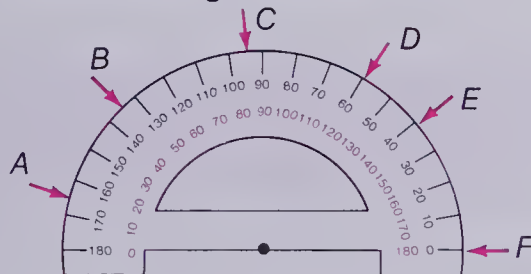
Step 1

Place the centre of the protractor on the vertex of the angle.

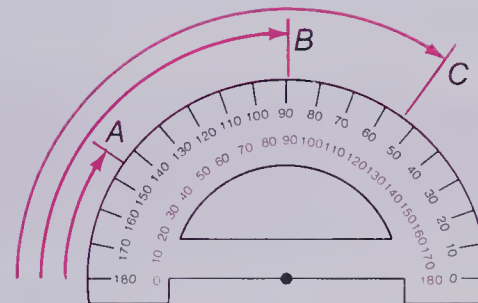
## Exercises

What is the reading at each arrow?

1.

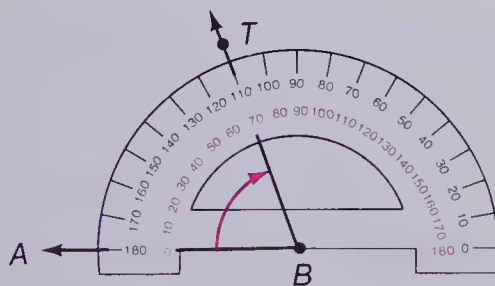


2.



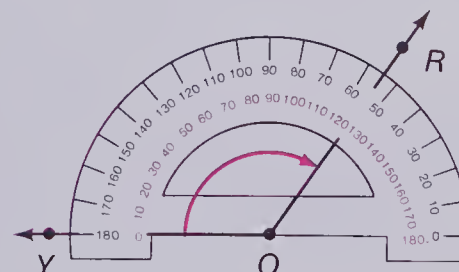
What is the measure of each angle?

3.



Hint! Use inside scale.

4.



Use your protractor. What is the measure of each angle?

5.



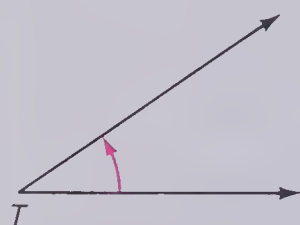
6.



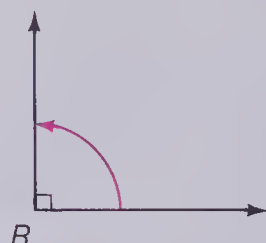
7.



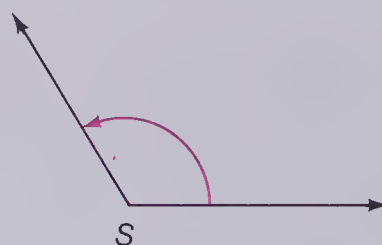
# More About Angles



Acute angle



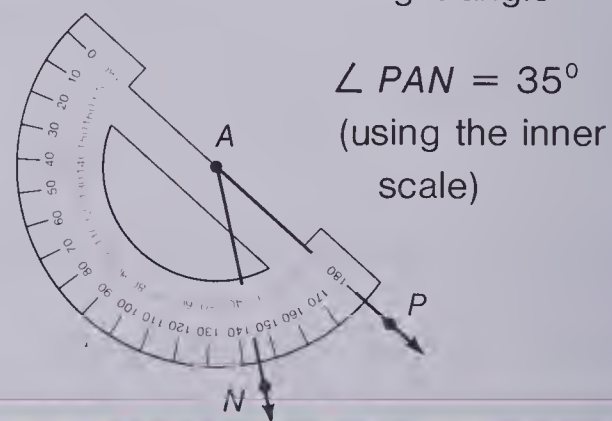
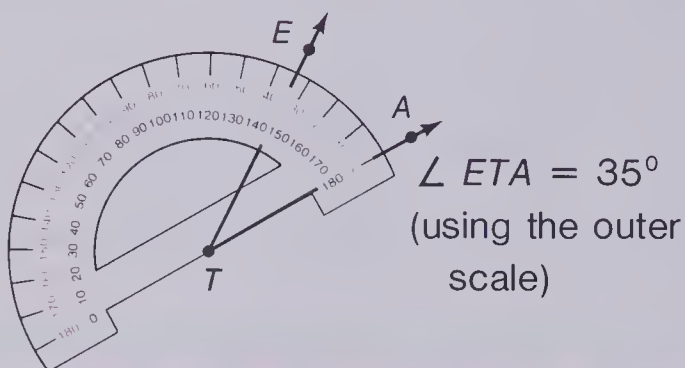
Right angle



Obtuse angle



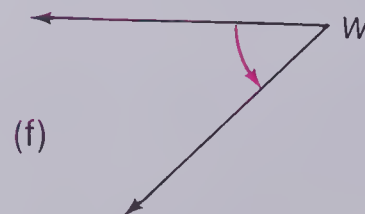
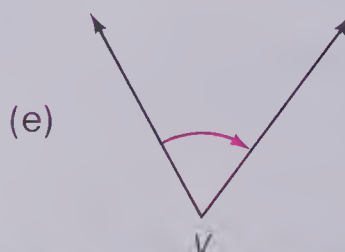
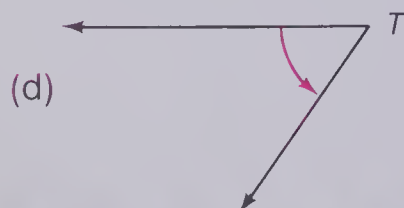
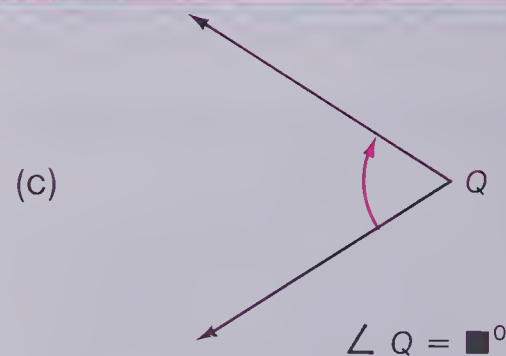
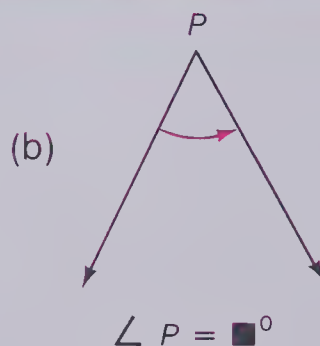
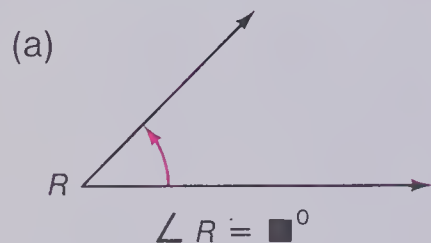
Straight angle



The two angles have the same measures.  
The angles are **congruent**.

## Exercises

1. Measure each angle.

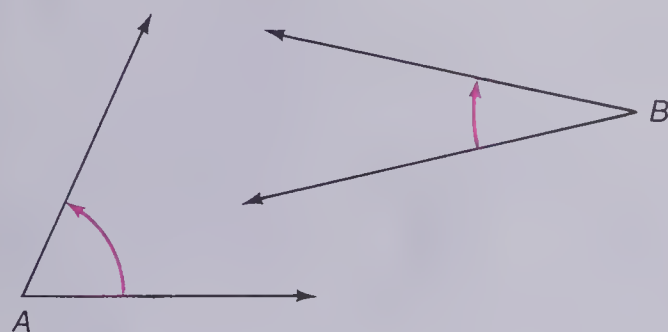


2. Which pairs of angles in Exercise 1 are congruent?

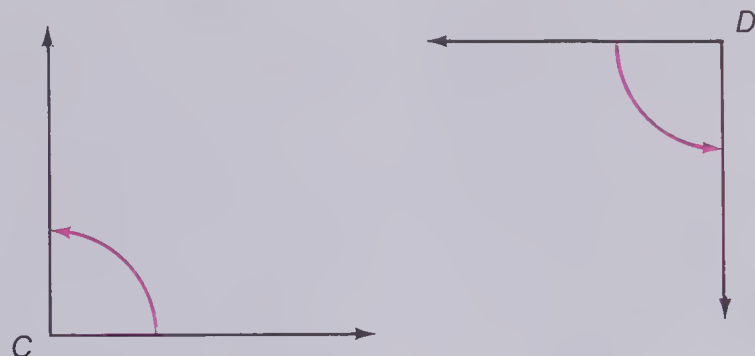


3. Measure each angle.

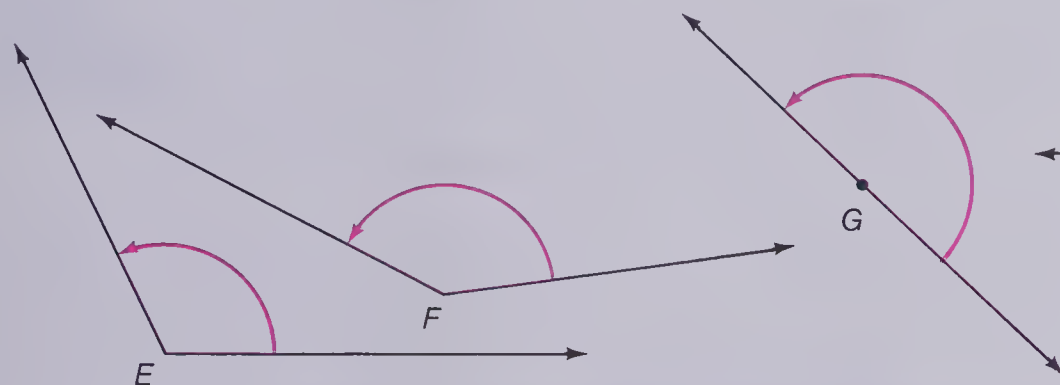
Acute angles



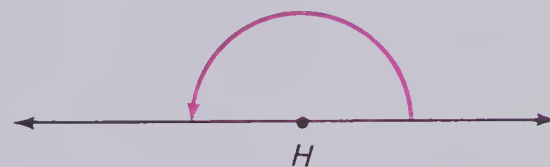
Right angles



Obtuse angles



Straight angles



4. Draw two angles of each kind: acute, right, straight, obtuse. Label and name each.

5. Copy and complete.

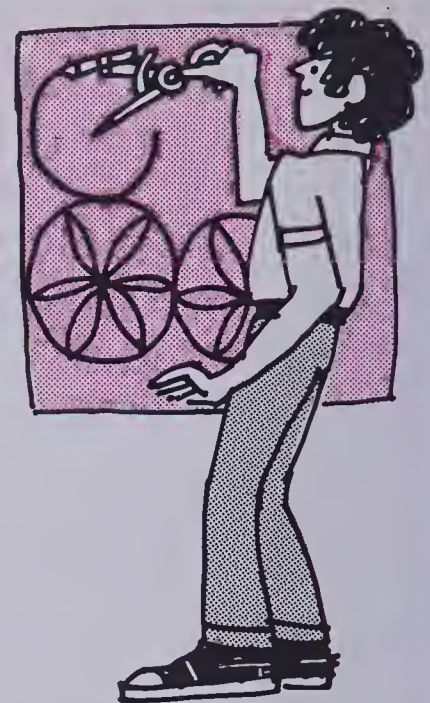
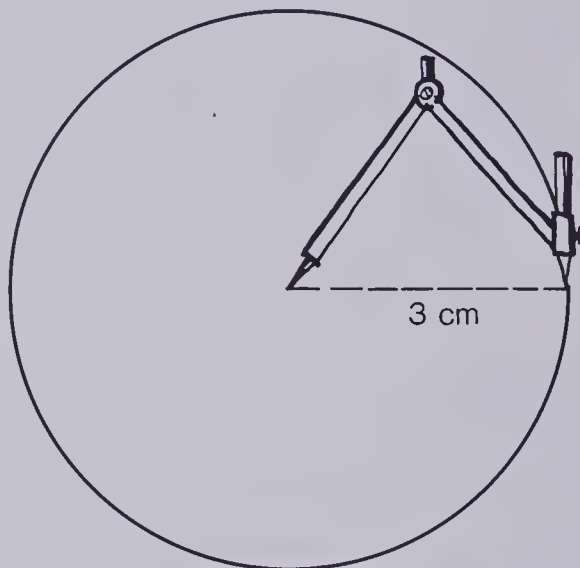
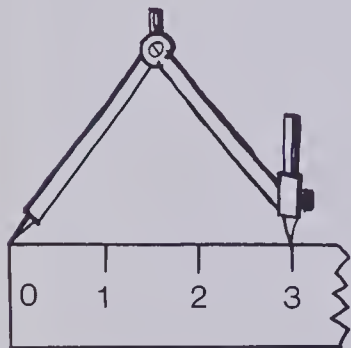
- (a) Angles with measures less than  $90^\circ$  are  angles.
- (b) Angles with measures of  $90^\circ$  are  angles.
- (c) Angles with measures greater than  $90^\circ$  and less than  $180^\circ$  are  angles.
- (d) Angles with measures of  $180^\circ$  are  angles.

6. Copy and complete.

- (a) The measure of any straight angle is .
- (b) The measure of any right angle is .
- (c) The measure of any obtuse angle is greater than  and less than .
- (d) The measure of any acute angle is less than .

# Using Compasses

Draw a circle with a radius of 3 cm.



## Exercises

Draw circles using each of these as the radius.

1.  $A$  \_\_\_\_\_  $B$       2.  $C$  \_\_\_\_\_  $D$       3.  $E$  \_\_\_\_\_  $F$

4. Measure the radius of each circle to the nearest tenth of a centimetre.

5. Draw a circle with:

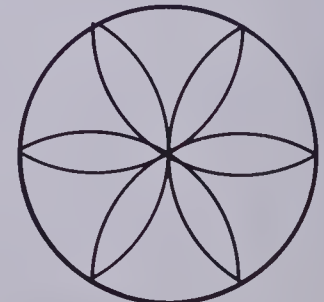
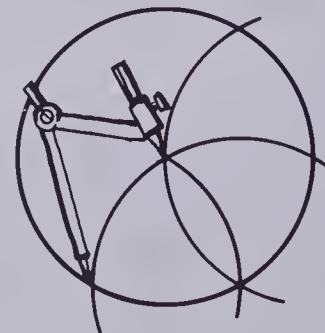
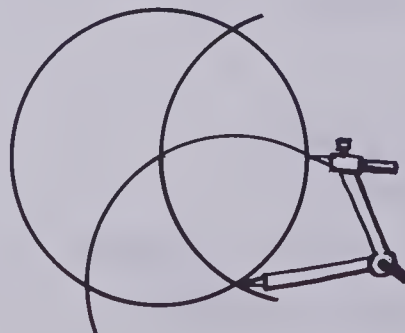
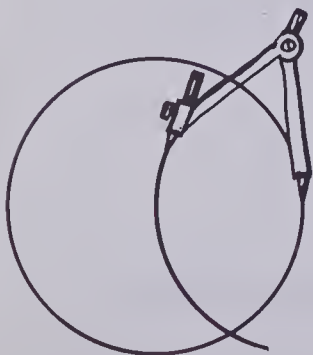
(a) radius 2.8 cm

(b) radius 33 mm

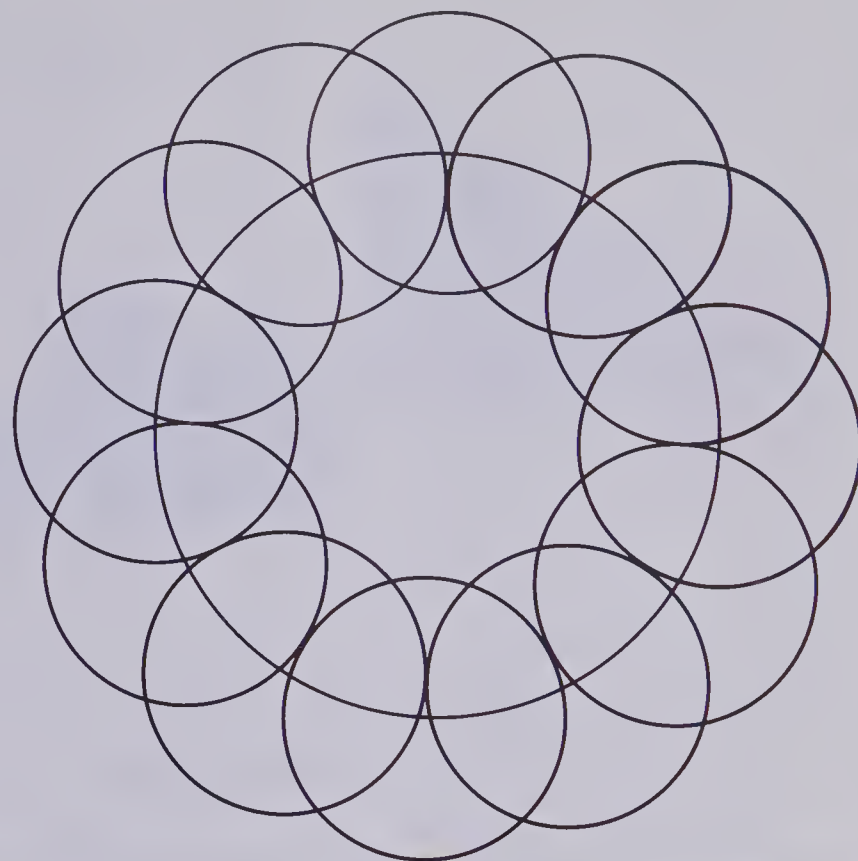
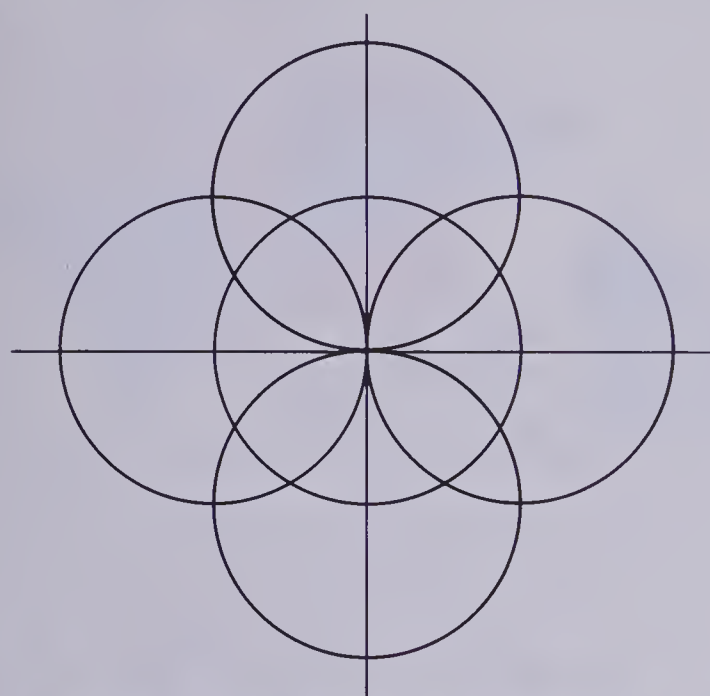
(c) radius 52 mm

6. Measure the diameter of each of the three circles in Exercise 5.

7. Copy this design. Do not change the radius on your compass.



8. Copy and colour each design.



9. Make and colour your own design.

## Tune Up

1. (a)	$\begin{array}{r} 72 \\ + 108 \\ \hline \end{array}$	(b)	$\begin{array}{r} 36 \\ + 144 \\ \hline \end{array}$	(c)	$\begin{array}{r} 155 \\ + 25 \\ \hline \end{array}$	(d)	$\begin{array}{r} 137 \\ + 43 \\ \hline \end{array}$	(e)	$\begin{array}{r} 88 \\ + 92 \\ \hline \end{array}$
--------	--	-----	--	-----	--	-----	--	-----	---

2. (a)	$\begin{array}{r} 180 \\ - 37 \\ \hline \end{array}$	(b)	$\begin{array}{r} 180 \\ - 109 \\ \hline \end{array}$	(c)	$\begin{array}{r} 180 \\ - 56 \\ \hline \end{array}$	(d)	$\begin{array}{r} 180 \\ - 45 \\ \hline \end{array}$	(e)	$\begin{array}{r} 180 \\ - 163 \\ \hline \end{array}$
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3. (a)	$\begin{array}{r} 72 \\ 72 \\ + 36 \\ \hline \end{array}$	(b)	$\begin{array}{r} 90 \\ 43 \\ + 47 \\ \hline \end{array}$	(c)	$\begin{array}{r} 105 \\ 33 \\ + 42 \\ \hline \end{array}$	(d)	$\begin{array}{r} 98 \\ 31 \\ + 51 \\ \hline \end{array}$	(e)	$\begin{array}{r} 61 \\ 59 \\ + 60 \\ \hline \end{array}$
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4. (a)	$\$33.25 + \$6.97$	(b)	$7.3 - 2.43$	(c)	$41.4 + 0.532$
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# The Sum of Angles



## Activity

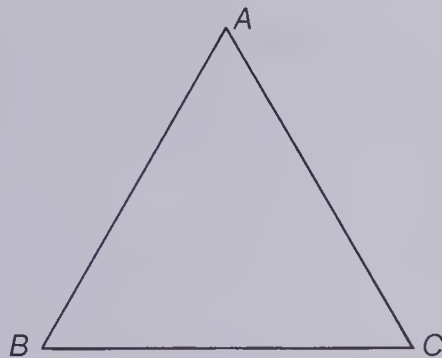
Refer to the display.

1. Draw a scalene triangle. Cut it out.  
Label and colour each angle as shown.  
Tear off the corners.  
Place the angles together as shown. Paste in your book.  
What is the sum of the angles?
2. Draw an isosceles triangle.  
Repeat Activity 1 again. What is the sum of the angles?
3. Draw 2 other triangles.  
(a) What is the sum of their angles?  
(b) What is the sum of the angles of any triangle?
4. Draw a quadrilateral (4-sided shape). Cut it out.  
Label and colour the angles as shown.  
Tear off the corners.  
Place the angles together as shown.  
What is the sum of the angles?
5. Draw another quadrilateral.  
Repeat Activity 4 again. What is the sum of the 4 angles in any quadrilateral?



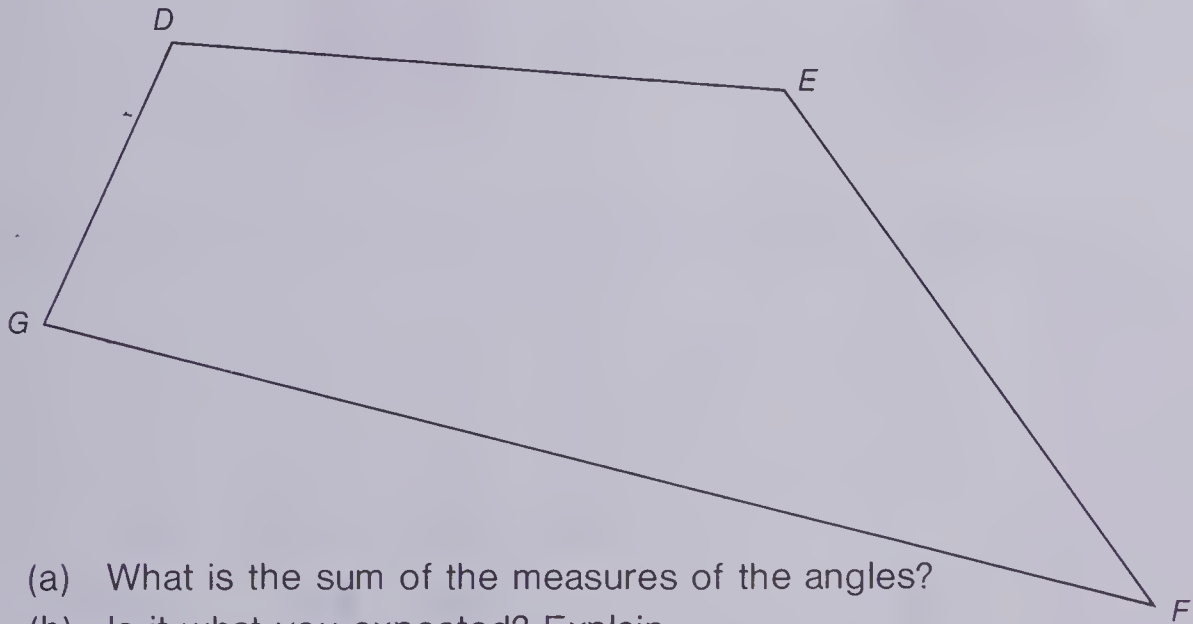
Exercises

1. Measure the angles. Record the data in the table.



Angle	Measure
A	
B	
C	
Sum	

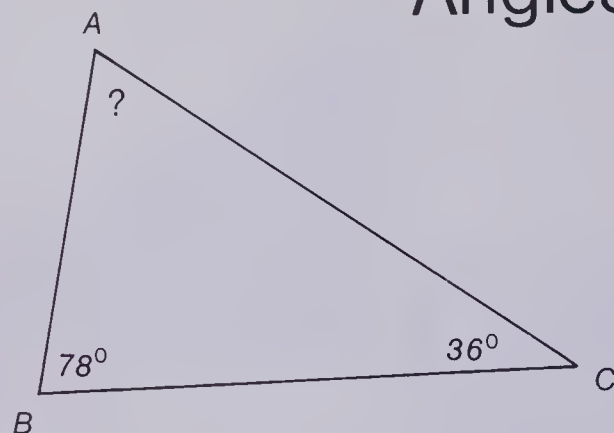
- (a) What is the sum of the measures of the angles?
- (b) Is it what you expected? Explain.
- (c) What do you know about the lengths of the sides of this triangle? What is the name of this special triangle?
- (d) What do you notice about the measures of the angles?
2. Measure the angles. Record the data in the table.



Angle	Measure
D	
E	
F	
G	
Sum	

- (a) What is the sum of the measures of the angles?
- (b) Is it what you expected? Explain.
3. Draw a rectangle.
- What is the measure of each angle of a rectangle?
- What is the sum of the measures of the angles of a rectangle?

# Angles of a Triangle



The sum of the measures of the angles of a triangle is  $180^\circ$ .

$$\angle B = 78^\circ$$

$$\angle C = 36^\circ$$

$$\underline{114^\circ}$$

$$180^\circ$$

$$- 114^\circ$$

$$\angle A = 66^\circ$$

The measure of  $\angle A$  is  $66^\circ$ .

## Exercises

Use a protractor. Complete the charts.

1. 

	Measure
$\angle C$	
$\angle A$	
$\angle B$	
Sum	

2. 

	Measure
$\angle R$	
$\angle U$	
$\angle N$	
Sum	

Calculate the measure of the third angle. Copy and complete the calculations.

Check your answers with a protractor.

3. 

$\angle K = 75^\circ$	$180^\circ$
$\angle M = 45^\circ$	$- \blacksquare$
$\underline{\hspace{1cm}}$	$\underline{\hspace{1cm}}$
$\blacksquare$	$\blacksquare$

4. 

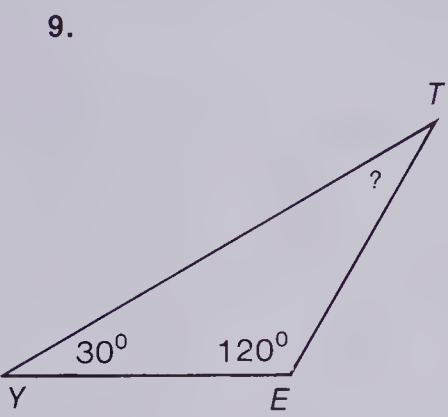
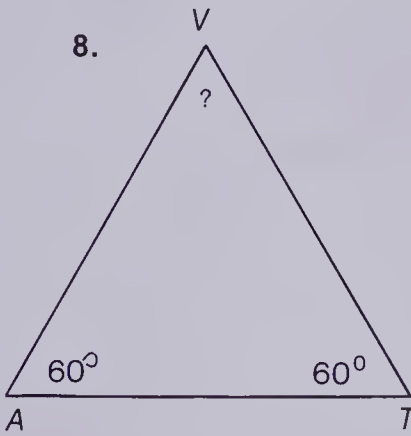
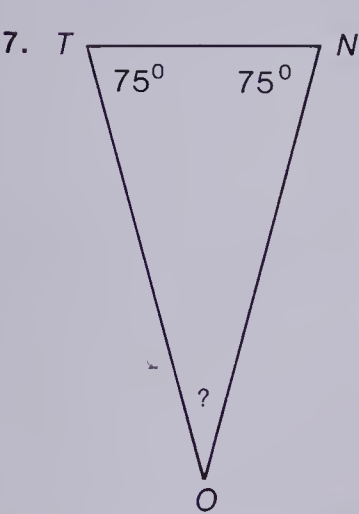
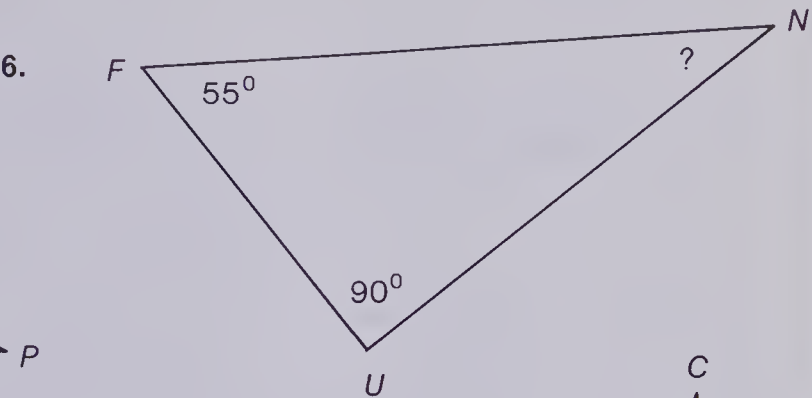
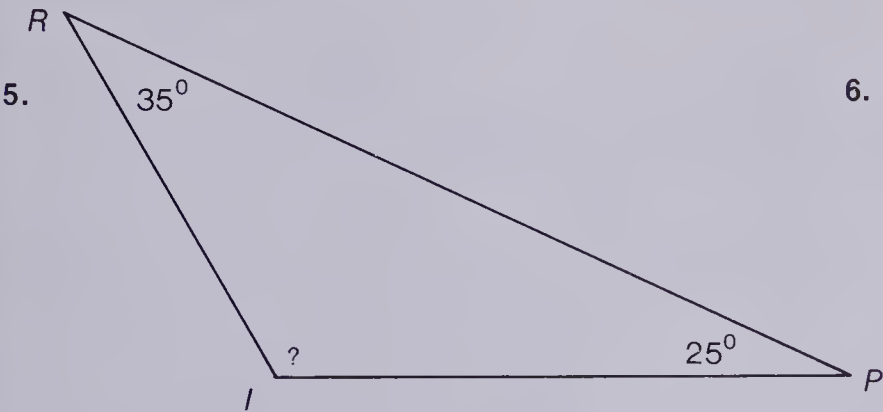
$\angle P = \blacksquare$	$180^\circ$
$\angle W = \blacksquare$	$- \blacksquare$
$\underline{\hspace{1cm}}$	$\underline{\hspace{1cm}}$
$\blacksquare$	$\blacksquare$

The measure of  $\angle L$  is  $\blacksquare^\circ$ .

The measure of  $\angle Q$  is  $\blacksquare^\circ$ .



Calculate the measure of the third angle.  
Check your answer with a protractor.



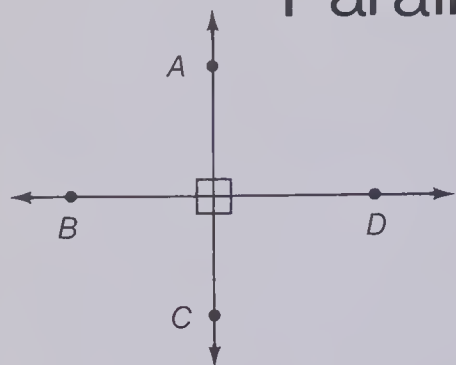
Find the measure of the missing angle. Copy and complete the chart.

	$\angle A$	$\angle T$	$\angle E$	Angle Sum
11.	$27^\circ$	$112^\circ$	■	$180^\circ$
12.	■	$59^\circ$	$68^\circ$	■
13.	$72^\circ$	■	$63^\circ$	■
14.	■	$110^\circ$	$45^\circ$	■
15.	$88^\circ$	■	$28^\circ$	■
16.	$128^\circ$	$35^\circ$	■	■
17.	$95^\circ$	■	$36^\circ$	■
18.	right angle	$45^\circ$	■	■
19.	■	$60^\circ$	right angle	■

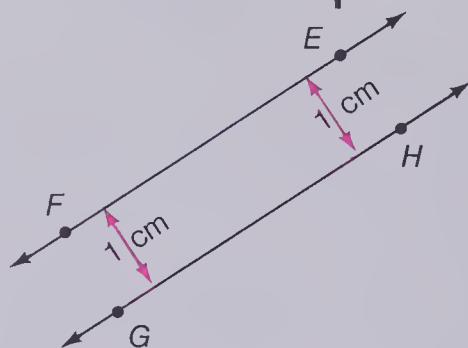
# BRAINTICKLER

Twin primes are prime numbers that differ by 2. There are 16 twin primes between 0 and 100. How many can you find?  
*Example:* 11 and 13.  
How many triplet primes can you find?  
*Example:* 3, 5, and 7.

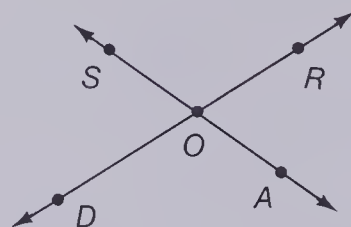
# Parallel and Perpendicular Lines



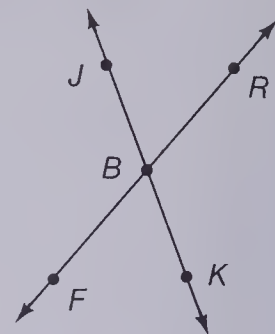
AC is perpendicular to BD.  
The angles at the intersection are *right* angles.



FE is parallel to GH.  
They will never intersect.



Intersecting lines cross. The angles at the intersection are *not* necessarily right angles.



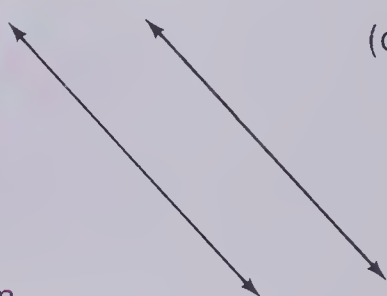
## Exercises

1. Name each pair of lines as perpendicular or parallel.

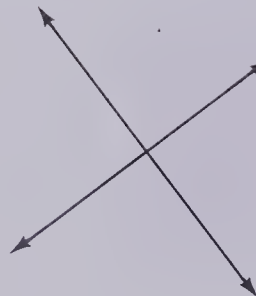
(a)



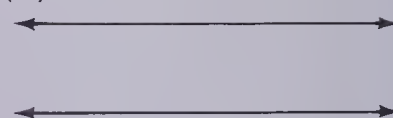
(b)



(c)



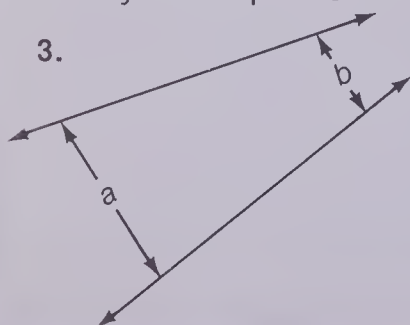
(d)



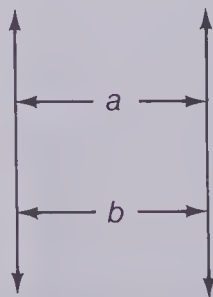
2. Look around your classroom.  
Find three examples of each.
- (a) parallel lines
  - (b) perpendicular lines
  - (c) intersecting lines

How far apart are the lines at *a* and at *b*?  
Identify each pair of lines as *parallel* or *not parallel*.

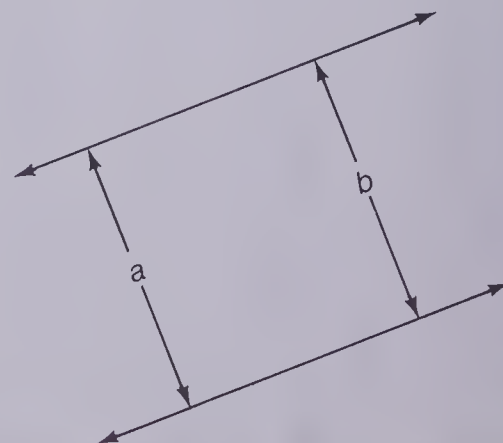
3.



4.



5.



6. Will the lines in Exercise 3 ever intersect? in Exercise 4? in Exercise 5?
7. Will parallel lines ever intersect?
8. Copy and complete.
  - (a) Two lines that intersect at right angles are        lines.
  - (b) Two lines that never intersect no matter how far they are drawn are        lines.

- ★ 9. Tom and Fred, two forestry workers, headed the same direction.

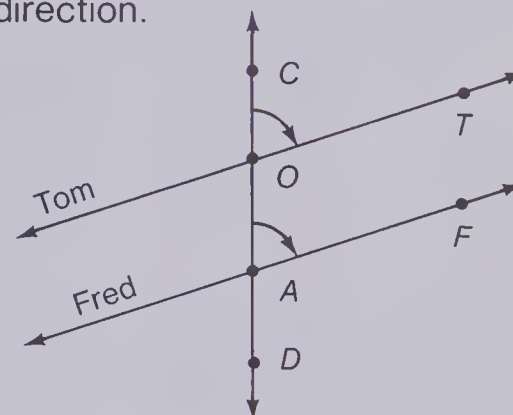
They travelled on parallel trails.

They crossed a third trail,  $CD$ .

Measure  $\angle COT$  and  $\angle OAF$ .

What do you notice about the measure of these angles?

	Measure
$\angle COT$	
$\angle OAF$	

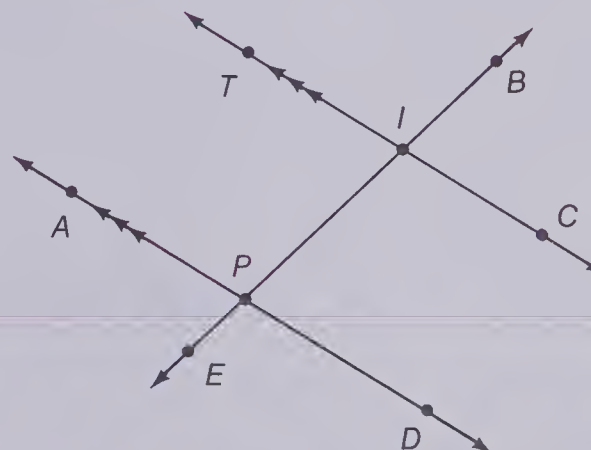


Use your protractor.

10.  $TC$  is parallel to  $AD$ .

(a)

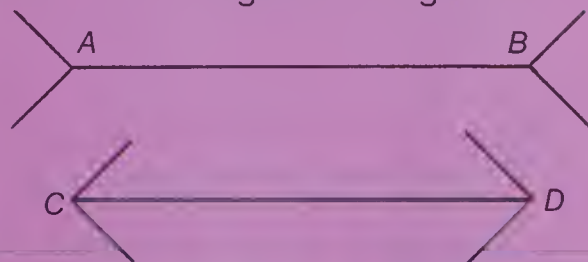
	Measure
$\angle TIP$	
$\angle APE$	



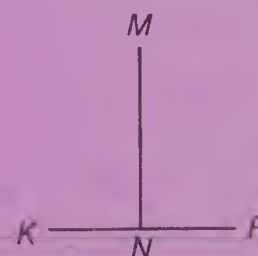
- ★ (b) Find other pairs of equal angles.

## BRAINTICKLER

Which is the longer line segment?

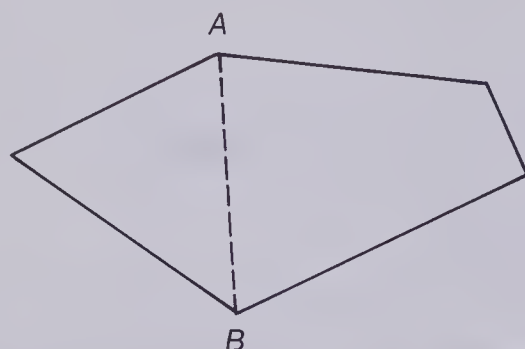


Which segment is longer,  $MN$  or  $KR$ ?





# Polygons and Diagonals



A **diagonal** joins two nonadjacent vertices of a polygon.

$AB$  is a diagonal.

How many diagonals can be drawn in a pentagon?

## Exercises

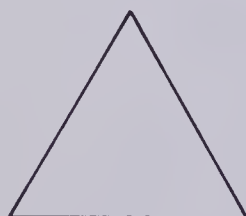
Trace each polygon.

In each, draw in all the diagonals.

Record your data in a chart.

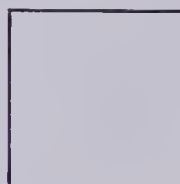
Name of Polygon	Number of Sides	Number of Diagonals
Triangle	3	0
Quadrilateral	4	■

1.



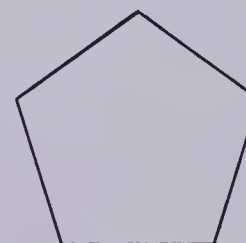
Triangle

2.



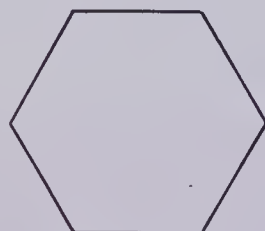
Quadrilateral (square)

3.



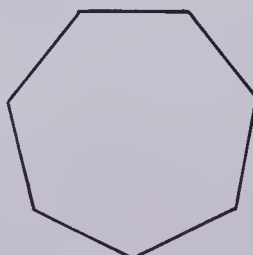
Pentagon

4.



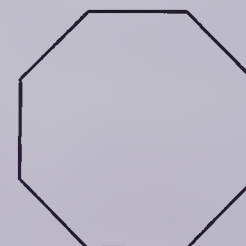
Hexagon

5.



Heptagon

6.



Octagon

7. Predict how many diagonals are in:

(a) a nine-sided polygon,

(b) a ten-sided polygon,

(c) a twelve-sided polygon.

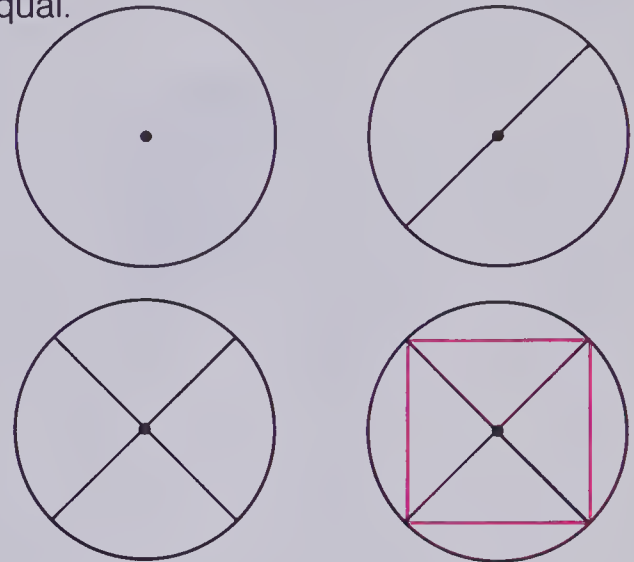
(d) Draw each figure and its diagonals to check your predictions.

# Polygons in Circles

A **regular polygon** has all sides equal and all angles equal.

1. Let's draw a regular polygon in a circle.

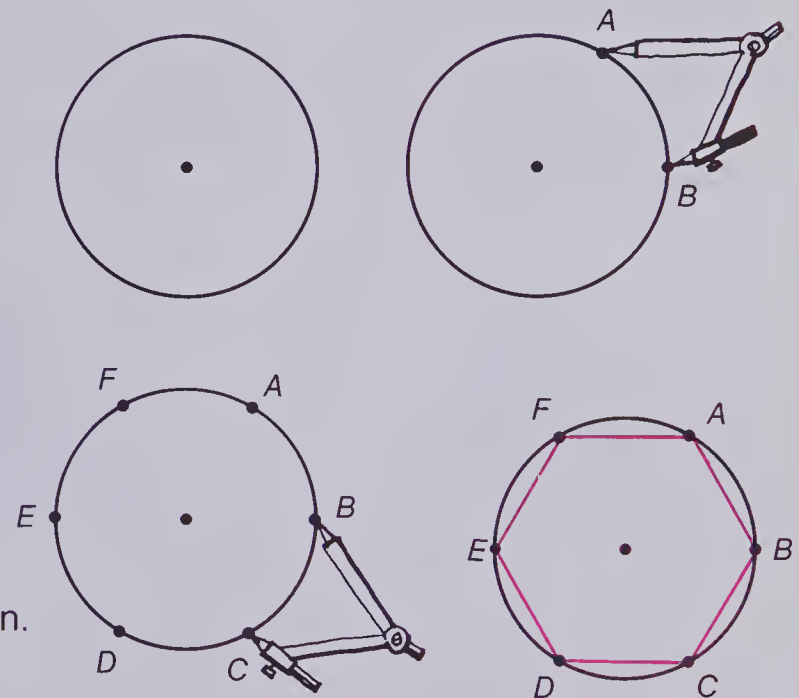
- (a) Draw a circle.
- (b) Draw a diameter of the circle.
- (c) Draw another diameter *perpendicular* to the first diameter.
- (d) Draw coloured segments to join the ends of the diameters.
- (e) Name the four-sided figure formed by the coloured segments.



2. Make an octagon (eight-sided figure), using the above method.

3. Let's draw another polygon in a circle.

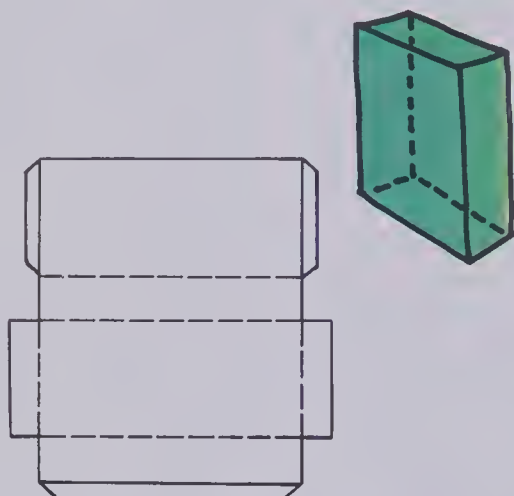
- (a) Draw a circle. **Keep the same radius for the rest of this exercise.**
- (b) Mark a point *A* on the circle.
- (c) Place the compasses on *A* and mark another point *B* on the circle.
- (d) Repeat this to mark points *C*, *D*, *E*, and *F* on the circle.
- (e) Draw coloured segments to join the points in order.
- (f) This coloured shape is a regular hexagon. Use your dictionary. What does *hex-* mean?



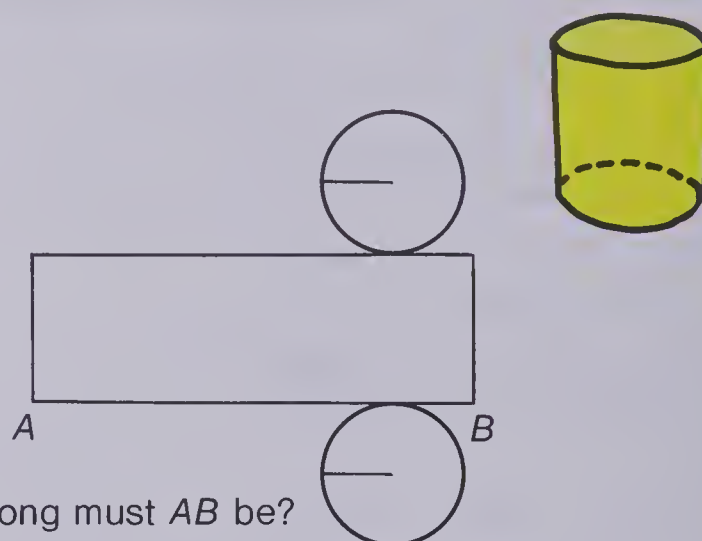
4. Repeat Steps (a) through (d) in Exercise 3. Then draw coloured segments to join the points *A*, *C*, and *E*. Name this regular polygon.

# Drawing Nets

- A. Make your own nets to build these shapes.



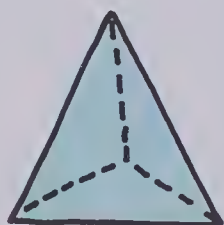
What edges must have the same measures?



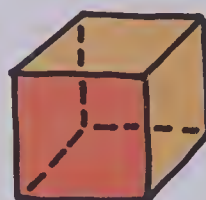
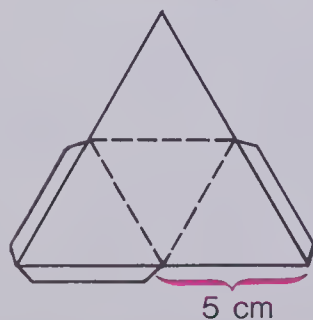
How long must  $AB$  be?

- B. Make your own nets to build these three *regular* polyhedra.

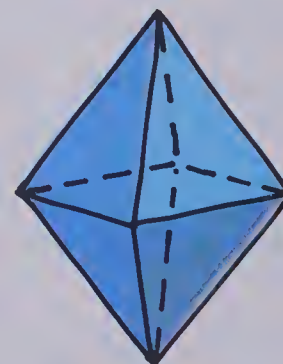
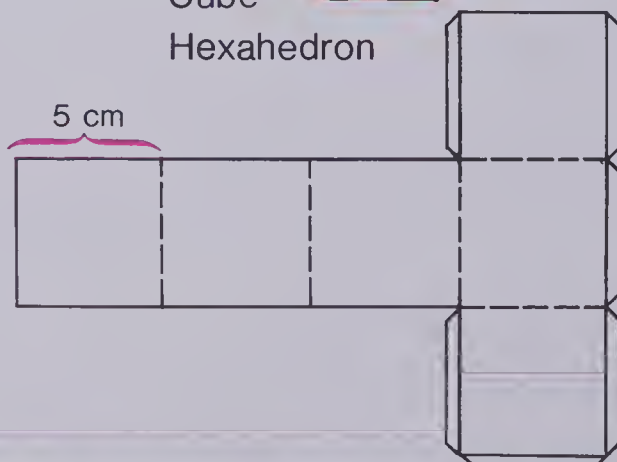
A *regular* shape is one in which all edges are the same length and all angles have the same measure.



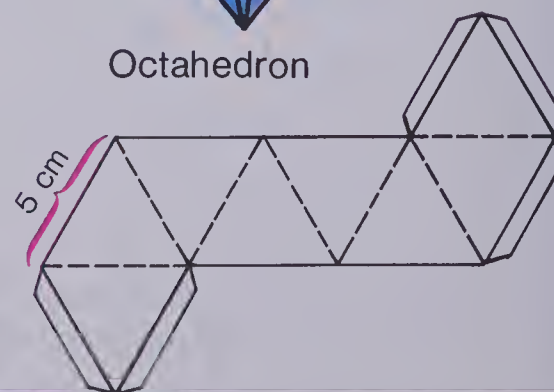
Tetrahedron



Cube  
Hexahedron



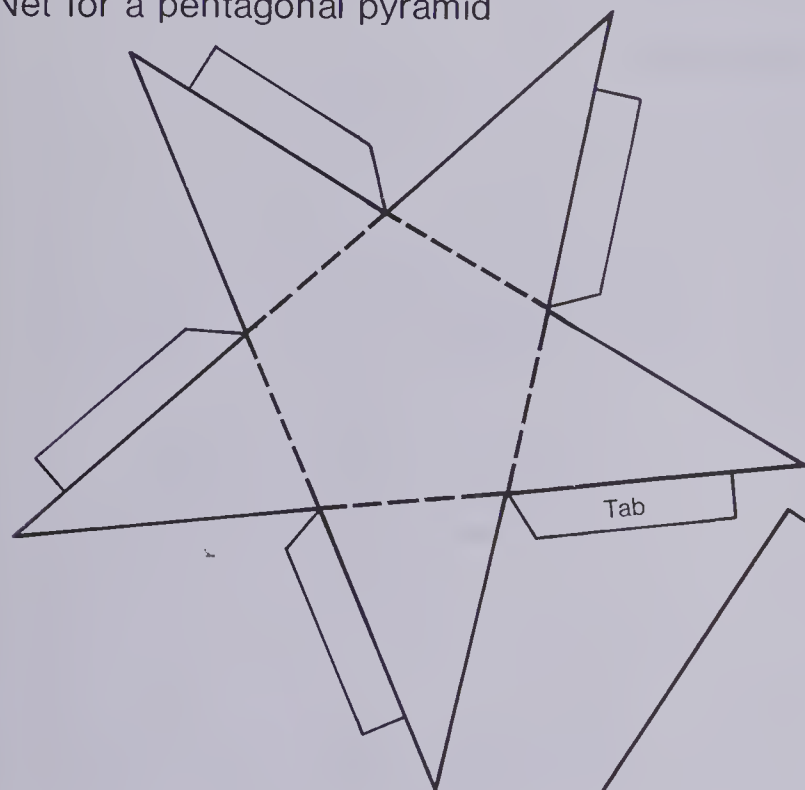
Octahedron





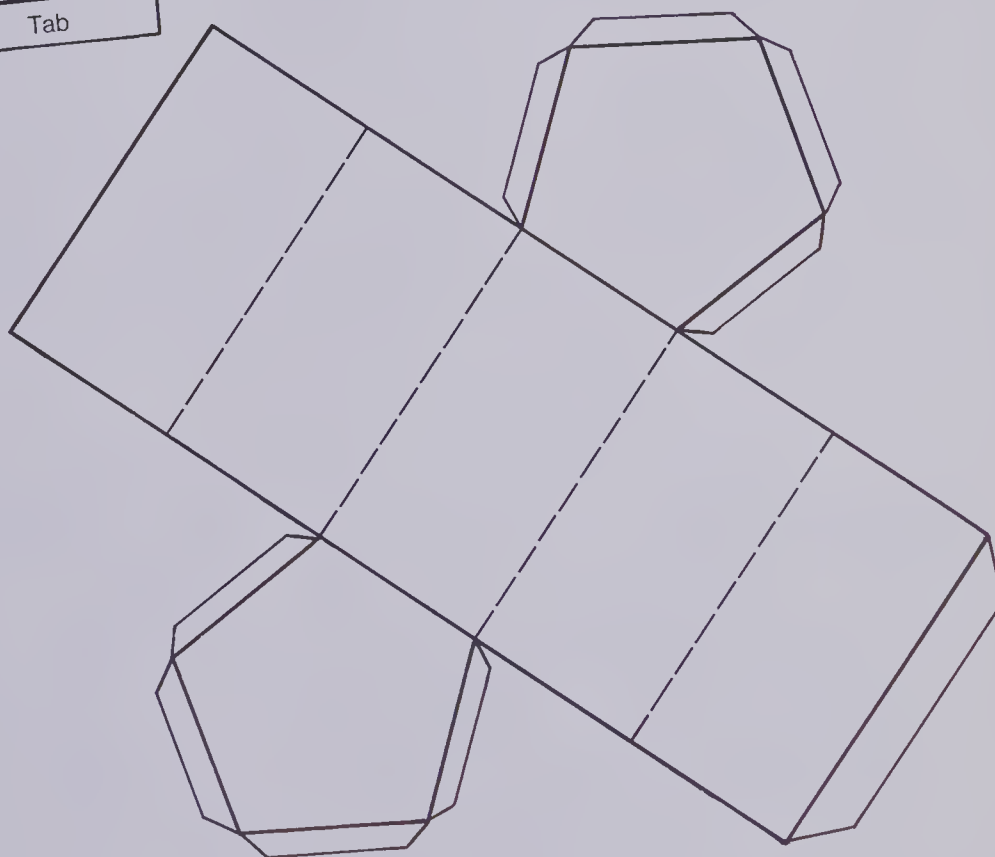
# Pentagonal Pyramid and Pentagonal Prism

Net for a pentagonal pyramid



1. Trace each shape onto heavy cardboard. Cut out and assemble to form the shapes.

2. How does a pyramid differ from a prism?



Net for a pentagonal prism

# Pop-up Dodecahedron

Trace this pattern onto cardboard. Make two patterns.

Fold lightly along the dotted lines.

Place the two patterns together as shown.

Attach a rubber band over and under the points, alternately.

Toss the model in the air.

It will form a dodecahedron.

(If you are not successful the first time,  
use a smaller rubber band and/or crease  
the folds.)

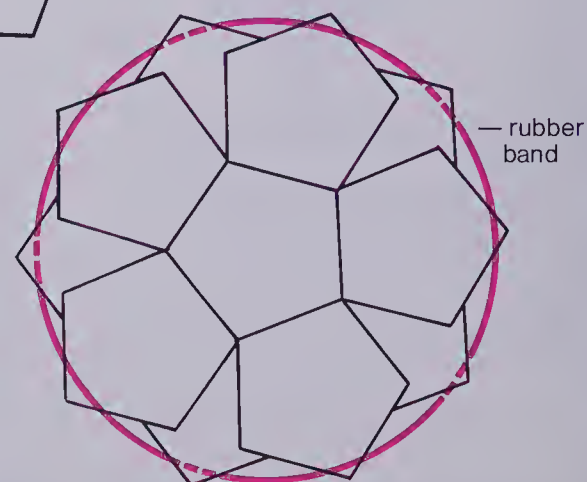
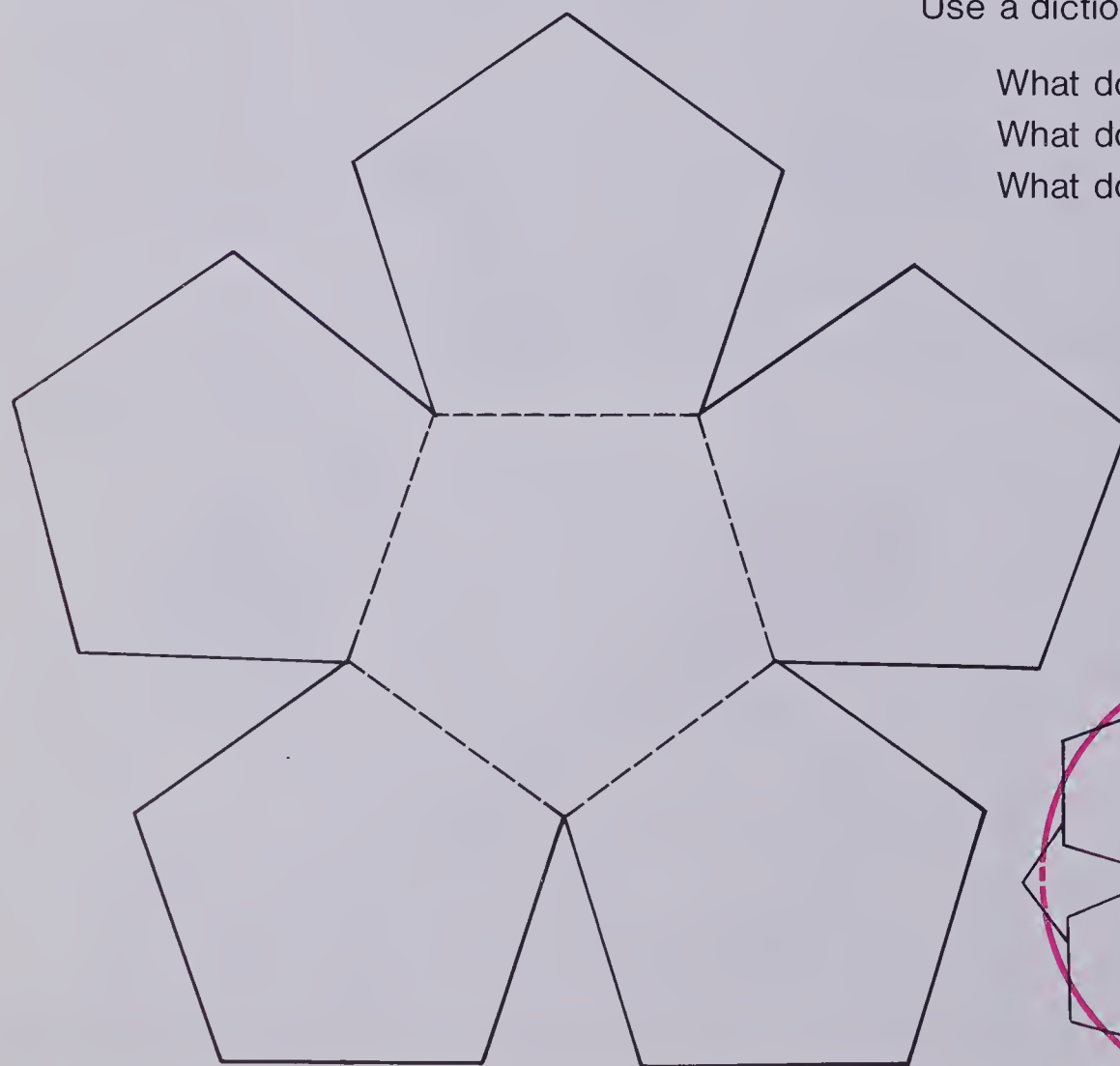
How many faces does a  
dodecahedron have?

Use a dictionary:

What does *dodeca-* mean?

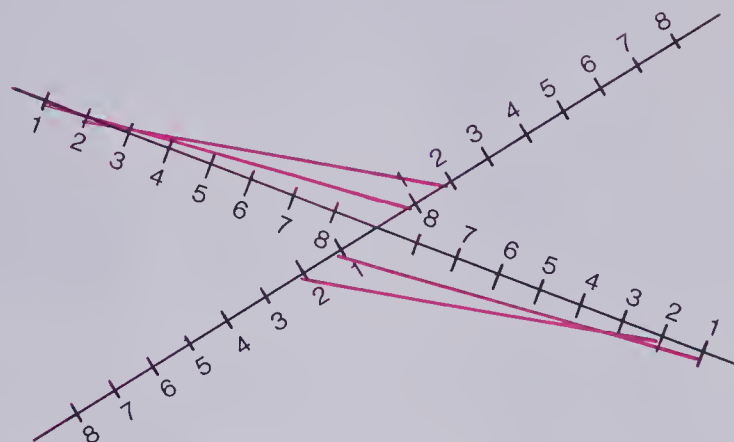
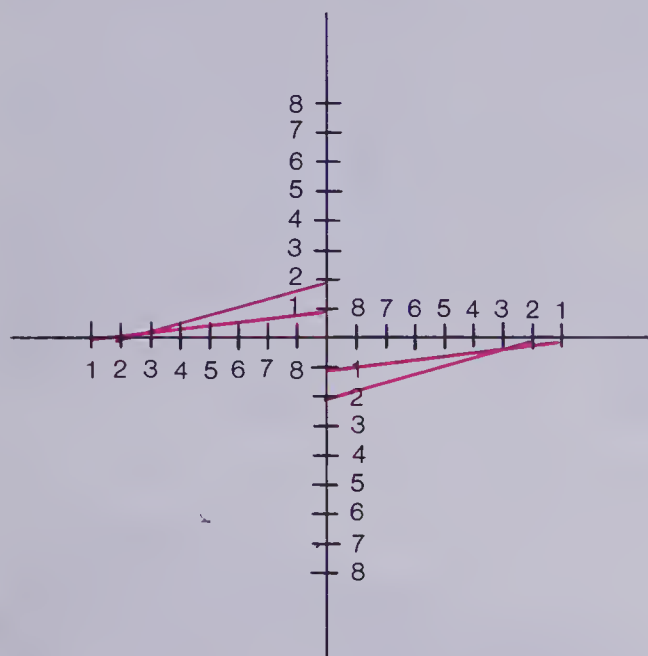
What does *-hedron* mean?

What does *dodecahedron* mean?

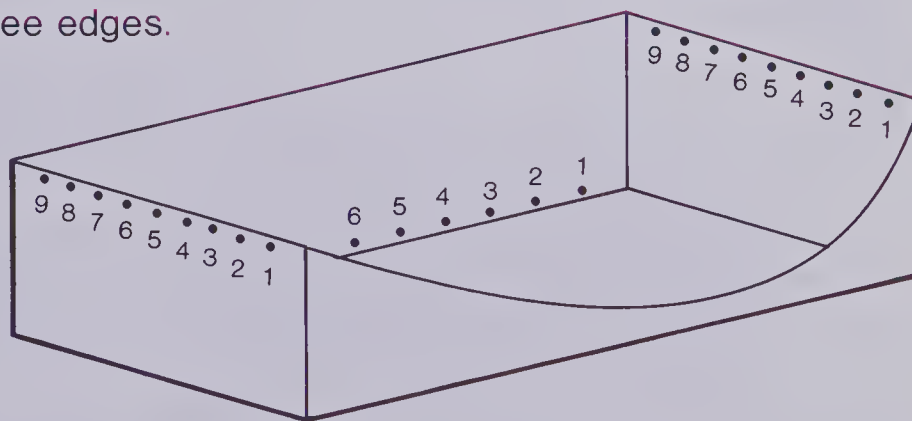


# Making Patterns with Straight Lines

- A. Trace each pattern. Draw lines from 1 → 1  
2 → 2, etc.



- B. Make other patterns of your own.
- C. Use a shoe box.  
Cut out one side as shown.  
Mark off and label as shown on three edges.  
Use a needle and coloured yarn to  
stitch from 1 → 1  
2 → 2, etc.
- Use two colours of yarn.



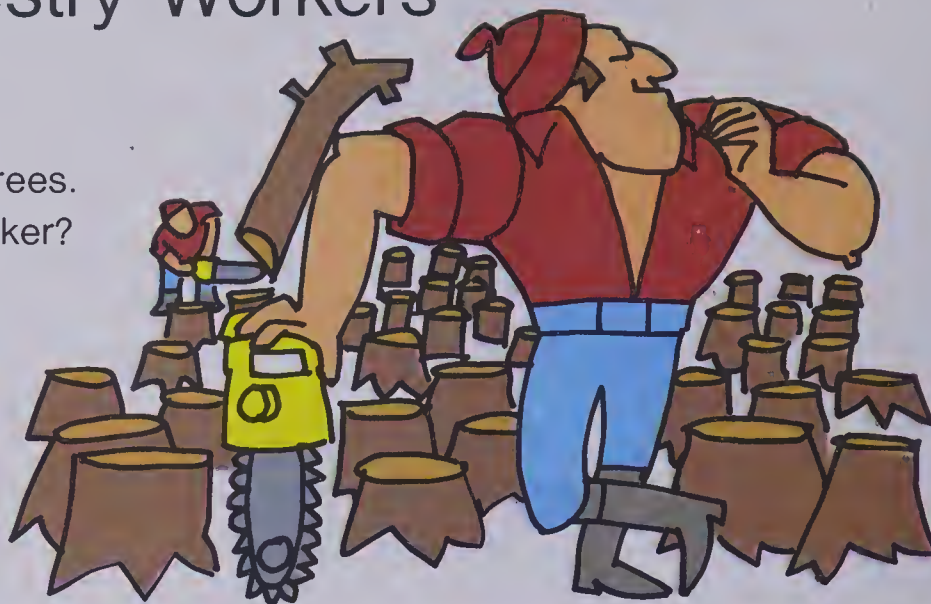
- D. Use another box. Make your own pattern.



# Forestry Workers

A team of 28 workers cut 1008 trees.  
Each worker cut the same number of trees.  
How many trees were cut by each worker?

Think: A team of 28.  
1008 trees cut.  
How many trees each?  
Operation: Division.



## Exercises

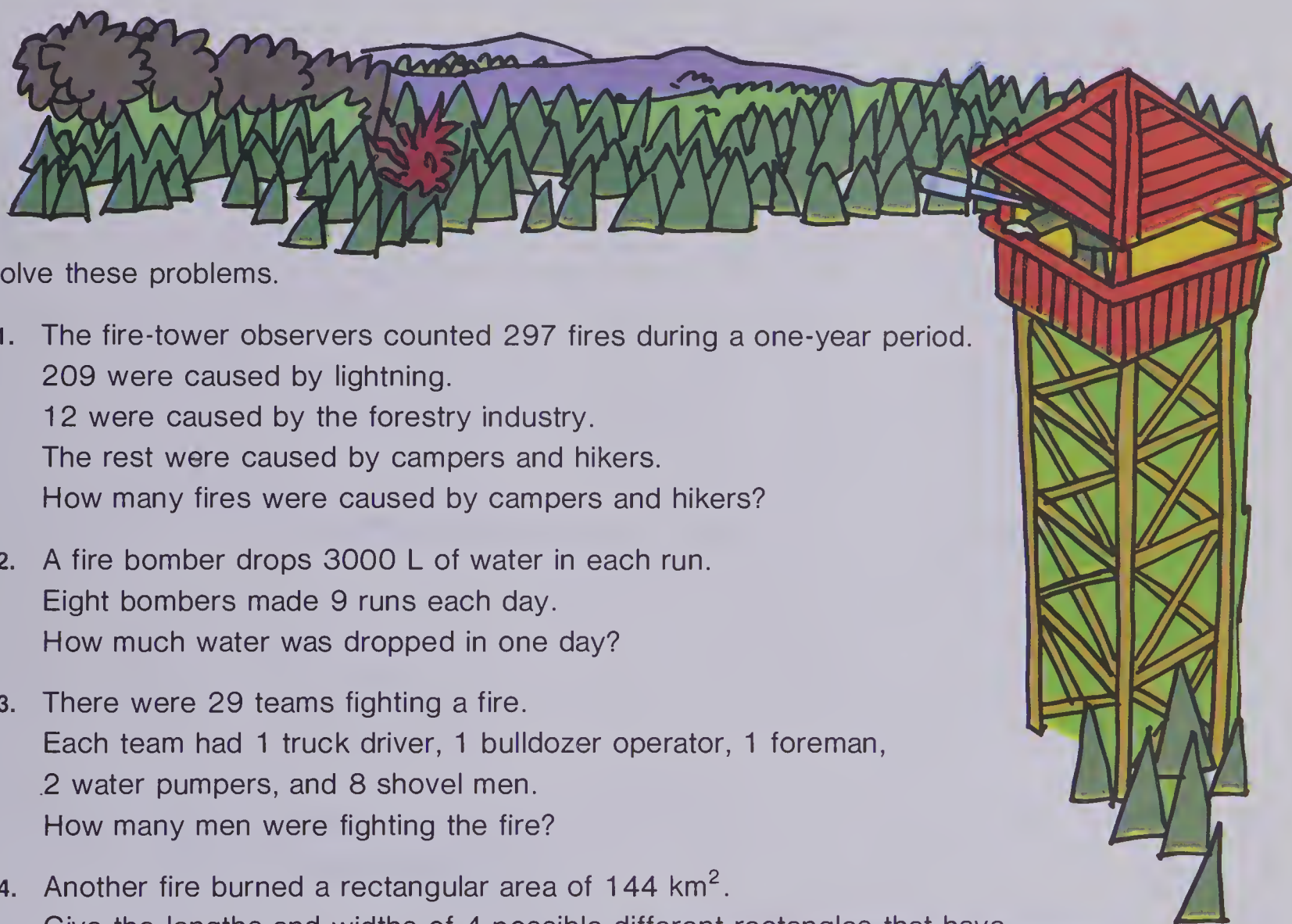
Decide what operation to use: addition, subtraction, multiplication, division.

*Do not solve.*

1. Each truck hauls 11 logs.  
There are 126 truckloads.  
How many logs?
2. The numbers of logs that arrived in 5 d were 35, 412, 218, 298, and 341.  
How many logs in all?
3. In a 12-month period, 1128 flatcars of lumber were shipped.  
What was the average number of flatcars of lumber shipped per month?
4. In the first year, a planer mill shipped 1726 boxcars and 1184 truckloads of shavings.  
In the second year, 2394 boxcars and 798 truckloads were shipped.  
How many more boxcars were shipped in the second year than in the first year?
5. Each tree-feller receives \$1247 per month.  
There are 24 tree-fellers and 18 machine operators.  
What is the total of the monthly salaries of the tree-fellers?

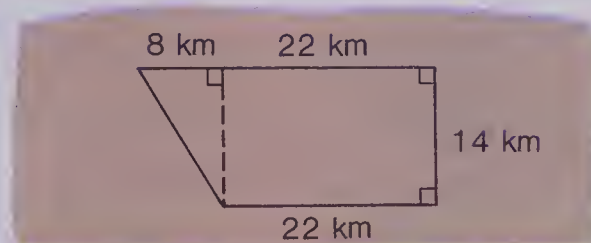


# Forestry Firefighters



Solve these problems.

1. The fire-tower observers counted 297 fires during a one-year period.  
209 were caused by lightning.  
12 were caused by the forestry industry.  
The rest were caused by campers and hikers.  
How many fires were caused by campers and hikers?
2. A fire bomber drops 3000 L of water in each run.  
Eight bombers made 9 runs each day.  
How much water was dropped in one day?
3. There were 29 teams fighting a fire.  
Each team had 1 truck driver, 1 bulldozer operator, 1 foreman,  
2 water pumpers, and 8 shovel men.  
How many men were fighting the fire?
4. Another fire burned a rectangular area of  $144 \text{ km}^2$ .  
Give the lengths and widths of 4 possible different rectangles that have  
an area of  $144 \text{ km}^2$ .
5. One fire burned the area as shown.  
How many square kilometres of forest  
were burned?
6. In every hour that a forest fire raged, enough timber was burned to make 100 houses.  
The fire raged 18 d.  
How many houses could have been built with the timber that burned?

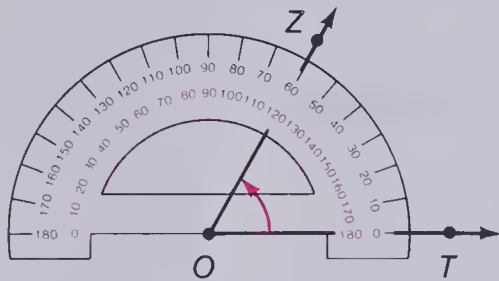


# Chapter Test

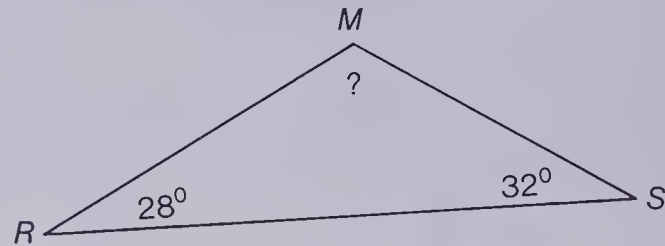
- The radius of a circle is 25 mm.  
What is the length of the diameter?

- What is the measure in degrees of a right angle?

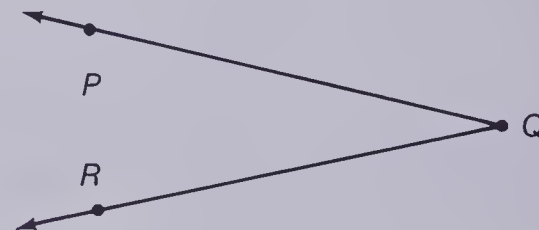
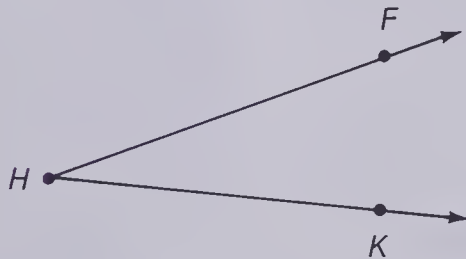
- What is the measure of  $\angle ZOT$ ?



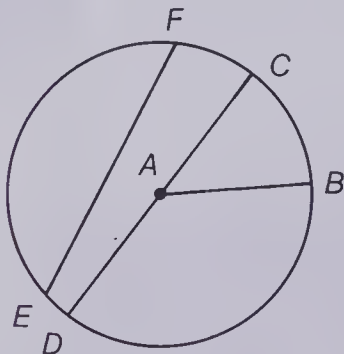
- What is the measure of  $\angle M$ ?



- Use your protractor. Are  $\angle FHK$  and  $\angle PQR$  congruent? Explain.



- 



Which line segment names each?

(a) radius (b) chord (c) diameter

- State the number of faces on a:

(a) tetrahedron (b) octahedron

- Use your compasses to draw a triangle with all sides equal in a circle.

- Match:

(a) quadrilateral

1.



(b) pentagon

2.



(c) octagon

3.



(d) hexagon

4.



- Draw a pair of parallel lines.



# Cumulative Review

1. (a) 
$$\begin{array}{r} 34.567 \\ + 8.261 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 456.6 \\ 861.8 \\ + 813.222 \\ \hline \end{array}$$

2. (a) 
$$\begin{array}{r} 64.32 \\ - 8.919 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} \$ 347.16 \\ - 11.63 \\ \hline \end{array}$$

3. Write in figures.

(a) sixty-two billion, seven hundred million, sixty-five

(b) nine million, six hundred thousand, three hundred five

4. In the number 6 315 402 791, what is the place value of:

(a) 6?

(b) 5?

(c) 2?

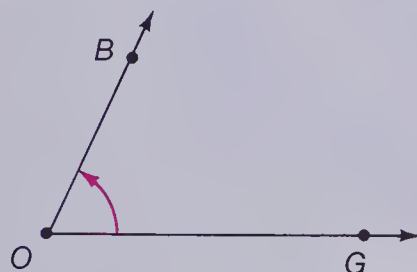
(d) 3?

(e) 4?

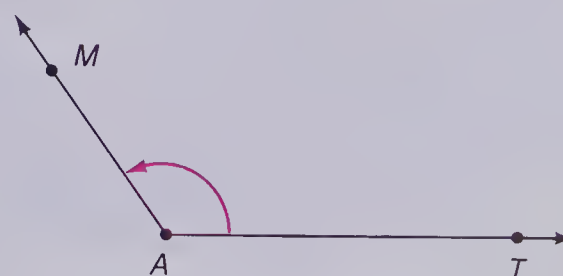
5. Use your protractor.

What is the measure of each angle?

(a)



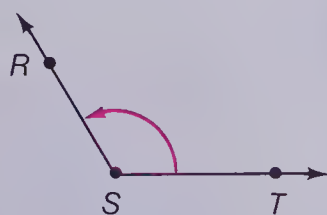
(b)



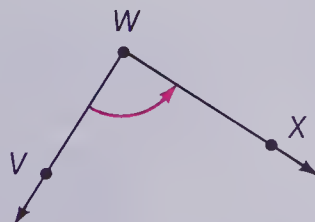
6. Name each angle as acute, right, obtuse, or straight.

7. Find the measure of  $\angle K$ .

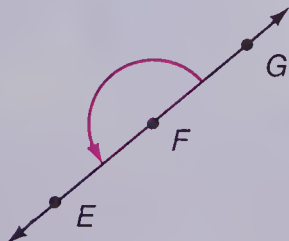
(a)



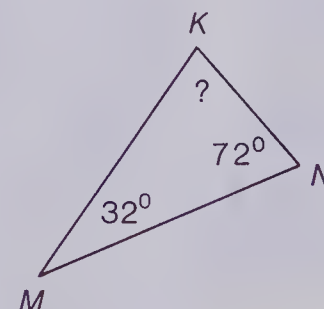
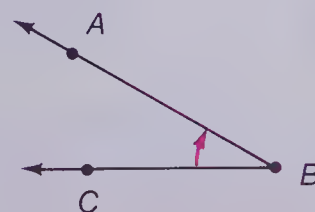
(b)



(c)



(d)



# Chapter 3

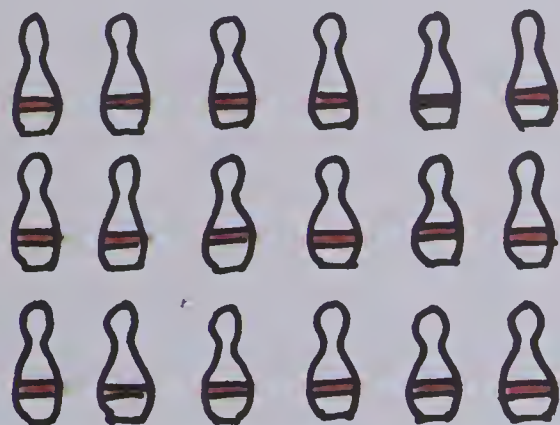
# Multiplication

Whole Numbers and Decimals



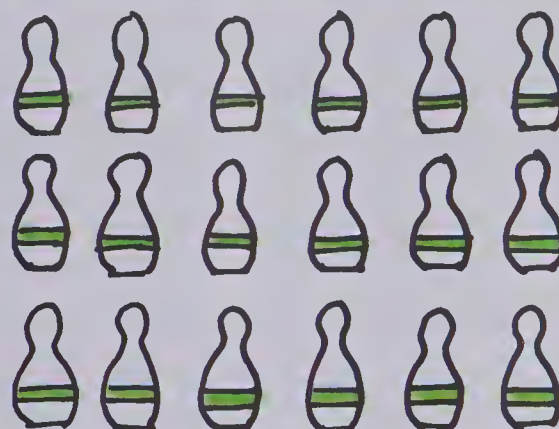
# Multiplication

Bobby bowled 3 balls.  
He knocked down 6 pins with each ball.  
How many pins did he knock down altogether?



6 pins + 6 pins + 6 pins = 18 pins  
or

$$6 + 6 + 6 = 18$$



3 groups of 6 pins = 18 pins  
or

$$3 \times 6 = 18$$

Factor    Factor    Product

## Exercises

Solve by adding. Solve by multiplying. Which is quicker?

1. There are 6 rows of exercises.  
Each row has 5 questions.  
How many questions?
2. There are 19 cows.  
They have 4 legs each.  
How many legs?
3. There are 6 boys.  
They have 25 marbles each.  
How many marbles?
4. There are 12 eggs in 1 carton.  
There are 9 cartons.  
How many eggs?
5. There are 24 batteries in each carton.  
There are 8 cartons.  
How many batteries?
6. There are 42 chocolates in a box.  
There are 7 boxes.  
How many chocolates?



# Tune Up

Calculate.

1. (a) $\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$	(b) $\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$	(c) $\begin{array}{r} 9 \\ \times 7 \\ \hline \end{array}$	(d) $\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$	(e) $\begin{array}{r} 8 \\ \times 9 \\ \hline \end{array}$
---	--	--	--	--

2. (a) $\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$	(b) $\begin{array}{r} 2 \\ \times 9 \\ \hline \end{array}$	(c) $\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$	(d) $\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$	(e) $\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$
---	--	--	--	--

3. (a) $\begin{array}{r} 23 \\ \times 3 \\ \hline \end{array}$	(b) $\begin{array}{r} 32 \\ \times 4 \\ \hline \end{array}$	(c) $\begin{array}{r} 50 \\ \times 7 \\ \hline \end{array}$	(d) $\begin{array}{r} 41 \\ \times 6 \\ \hline \end{array}$	(e) $\begin{array}{r} 91 \\ \times 8 \\ \hline \end{array}$
--	---	---	---	---

4. (a) $\begin{array}{r} 16 \\ \times 6 \\ \hline \end{array}$	(b) $\begin{array}{r} 35 \\ \times 7 \\ \hline \end{array}$	(c) $\begin{array}{r} 14 \\ \times 9 \\ \hline \end{array}$	(d) $\begin{array}{r} 85 \\ \times 8 \\ \hline \end{array}$	(e) $\begin{array}{r} 78 \\ \times 7 \\ \hline \end{array}$
--	---	---	---	---

5. (a) $\begin{array}{r} 243 \\ \times 2 \\ \hline \end{array}$	(b) $\begin{array}{r} 172 \\ \times 3 \\ \hline \end{array}$	(c) $\begin{array}{r} 283 \\ \times 4 \\ \hline \end{array}$	(d) $\begin{array}{r} 859 \\ \times 7 \\ \hline \end{array}$	(e) $\begin{array}{r} 813 \\ \times 5 \\ \hline \end{array}$
---	--	--	--	--

6. (a) $\begin{array}{r} 4250 \\ \times 6 \\ \hline \end{array}$	(b) $\begin{array}{r} 5173 \\ \times 4 \\ \hline \end{array}$	(c) $\begin{array}{r} 1634 \\ \times 9 \\ \hline \end{array}$	(d) $\begin{array}{r} 2408 \\ \times 7 \\ \hline \end{array}$	(e) $\begin{array}{r} 7234 \\ \times 3 \\ \hline \end{array}$
--	---	---	---	---

Tune Up Score Card	
	Points
Super	30-27
Good	26-21
Average	20-15



# Numeration Systems

Here are some numerals used by early civilizations.

	1	10	100		
Egypt	I	Λ	ϭ	23	Λ Λ III
Babylon	Υ	<	Υ>	142	Υ> <<<< ΥΥ
Greece	α	ι	ρ	221	ρ ρ ιι α
Rome	I	X	C	230	CC XXXX

In modern times, Canada and most other countries use the Hindu-Arabic numeration system. This system has 10 basic symbols that are called digits. These digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. We use place value. Place value was not used in the ancient numeral systems shown.

## Exercises

1. Write the Hindu-Arabic numeral for each ancient Egyptian numeral.

(a) Λ Λ Λ III (b) Λ Λ Λ Λ II (c) ϭ ϭ Λ III (d) ϭ I

2. Write the Hindu-Arabic numeral for each Babylonian numeral.

(a) < ΥΥ (b) <<< (c) Υ>Υ (d) Υ> Υ>Υ> <Υ

3. Write the Hindu-Arabic numeral for each ancient Greek numeral.

(a) α α α (b) ιι (c) ρ ρ α (d) ρι

Write ancient Egyptian numerals.

4. 35                      5. 459

Write Babylonian numerals.

6. 288                      7. 602

Write ancient Greek numerals.

8. 209                      9. 56

Write Roman numerals.

10. 230                      11. 304

# Ones and Tens

1 group of 6 golf balls = 6 golf balls.

$$1 \times 6 = 6$$

$$\begin{array}{r} 6 \\ \times 1 \\ \hline 6 \end{array}$$



1 packet of tees has 25 tees.

10 packets have  $10 \times 25 = 250$  tees.

$$\begin{array}{r} 25 \\ \times 10 \\ \hline 250 \end{array}$$

## Exercises

1. (a)  $1 \times 8$

(b)  $1 \times 2$

(c)  $1 \times 9$

(d)  $1 \times 5$

(e)  $1 \times 7$

2. (a)  $\begin{array}{r} 12 \\ \times 1 \\ \hline \end{array}$

(b)  $\begin{array}{r} 28 \\ \times 1 \\ \hline \end{array}$

(c)  $\begin{array}{r} 49 \\ \times 1 \\ \hline \end{array}$

(d)  $\begin{array}{r} 85 \\ \times 1 \\ \hline \end{array}$

(e)  $\begin{array}{r} 97 \\ \times 1 \\ \hline \end{array}$

3. (a)  $432 \times 1$

(b)  $768 \times 1$

(c)  $579 \times 1$

(d)  $685 \times 1$

(e)  $927 \times 1$

4. (a)  $10 \times 4$

(b)  $10 \times 9$

(c)  $10 \times 5$

(d)  $10 \times 3$

(e)  $10 \times 8$

5. (a)  $\begin{array}{r} 27 \\ \times 10 \\ \hline \end{array}$

(b)  $\begin{array}{r} 35 \\ \times 10 \\ \hline \end{array}$

(c)  $\begin{array}{r} 52 \\ \times 10 \\ \hline \end{array}$

(d)  $\begin{array}{r} 36 \\ \times 10 \\ \hline \end{array}$

(e)  $\begin{array}{r} 85 \\ \times 10 \\ \hline \end{array}$

6. (a)  $\begin{array}{r} 482 \\ \times 10 \\ \hline \end{array}$

(b)  $\begin{array}{r} 853 \\ \times 10 \\ \hline \end{array}$

(c)  $\begin{array}{r} 768 \\ \times 10 \\ \hline \end{array}$

(d)  $\begin{array}{r} 589 \\ \times 10 \\ \hline \end{array}$

(e)  $\begin{array}{r} 417 \\ \times 10 \\ \hline \end{array}$

7. (a)  $\begin{array}{r} 403 \\ \times 1 \\ \hline \end{array}$

(b)  $\begin{array}{r} 450 \\ \times 10 \\ \hline \end{array}$

(c)  $\begin{array}{r} 700 \\ \times 1 \\ \hline \end{array}$

(d)  $\begin{array}{r} 900 \\ \times 10 \\ \hline \end{array}$

(e)  $\begin{array}{r} 23 \\ \times 10 \\ \hline \end{array}$

8. Write a rule for multiplying by 1.

9. Write a rule for multiplying by 10.



# Shirts and Gloves

There are 24 shirts in a box.

In 100 boxes there are  $100 \times 24 = 2400$  shirts.

$$\begin{array}{r} 24 \\ \times 100 \\ \hline \end{array}$$

$$\begin{array}{r} 2400 \\ \times 1000 \\ \hline \end{array}$$

There are 144 gloves in a box.

In 1000 boxes there are  $1000 \times 144 = 144\,000$  gloves.

$$\begin{array}{r} 144 \\ \times 1000 \\ \hline 144\,000 \end{array}$$



## Exercises

1. (a)  $100 \times 8$  (b)  $100 \times 4$  (c)  $100 \times 27$  (d)  $100 \times 94$  (e)  $100 \times 38$

2. (a)  $\begin{array}{r} 137 \\ \times 100 \\ \hline \end{array}$  (b)  $\begin{array}{r} 285 \\ \times 100 \\ \hline \end{array}$  (c)  $\begin{array}{r} 396 \\ \times 100 \\ \hline \end{array}$  (d)  $\begin{array}{r} 474 \\ \times 100 \\ \hline \end{array}$  (e)  $\begin{array}{r} 912 \\ \times 100 \\ \hline \end{array}$

3. (a)  $100 \times 4384$  (b)  $100 \times 7963$  (c)  $100 \times 5038$   
(d)  $100 \times 6456$  (e)  $100 \times 9124$

4. (a)  $1000 \times 7$  (b)  $1000 \times 5$  (c)  $1000 \times 23$   
(d)  $1000 \times 94$  (e)  $1000 \times 45$

5. (a)  $\begin{array}{r} 286 \\ \times 1000 \\ \hline \end{array}$  (b)  $\begin{array}{r} 687 \\ \times 1000 \\ \hline \end{array}$  (c)  $\begin{array}{r} 594 \\ \times 1000 \\ \hline \end{array}$  (d)  $\begin{array}{r} 857 \\ \times 1000 \\ \hline \end{array}$  (e)  $\begin{array}{r} 718 \\ \times 1000 \\ \hline \end{array}$

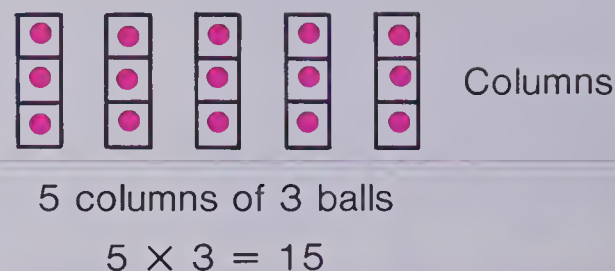
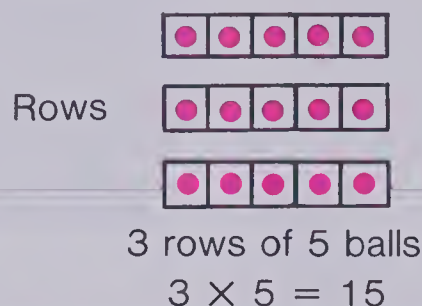
6. (a)  $\begin{array}{r} 4000 \\ \times 1000 \\ \hline \end{array}$  (b)  $\begin{array}{r} 350 \\ \times 100 \\ \hline \end{array}$  (c)  $\begin{array}{r} 42 \\ \times 10 \\ \hline \end{array}$  (d)  $\begin{array}{r} 5697 \\ \times 100 \\ \hline \end{array}$  (e)  $\begin{array}{r} 6324 \\ \times 10 \\ \hline \end{array}$

7. (a)  $\begin{array}{r} 3256 \\ \times 1 \\ \hline \end{array}$  (b)  $\begin{array}{r} 4000 \\ \times 10 \\ \hline \end{array}$  (c)  $\begin{array}{r} 42 \\ \times 1000 \\ \hline \end{array}$  (d)  $\begin{array}{r} 563 \\ \times 100 \\ \hline \end{array}$  (e)  $\begin{array}{r} 0 \\ \times 1 \\ \hline \end{array}$

8. Write a rule for multiplying by: (a) 100 (b) 1000.

# Rows and Columns

Here are 2 ways to show an array of balls.



In multiplication, the order of the factors does not change the product.

## Exercises

Copy and complete.

- (a)  $9 \times 8 = 72$       (b)  $8 \times 9 = \blacksquare$       (c)  $24 \times 6 = 144$       (d)  $6 \times 24 = \blacksquare$
- (a)  $9 \times 13 = 117$       (b)  $13 \times 9 = \blacksquare$       (c)  $2 \times 48 = 96$       (d)  $48 \times 2 = \blacksquare$
- (a)  $33 \times 3 = \blacksquare$       (b)  $3 \times 33 = \blacksquare$       (c)  $143 \times 73 = \blacksquare$       (d)  $73 \times 143 = \blacksquare$
- (a)  $\$3.60 \times 24 = \blacksquare$       (b)  $24 \times \$3.60 = \blacksquare$       (c)  $409 \times 70 = \blacksquare$       (d)  $70 \times \blacksquare = \blacksquare$
- (a)  $\$3.62 \times 201 = \blacksquare$       (b)  $\blacksquare \times \$3.62 = \blacksquare$       (c)  $921 \times 1000 = \blacksquare$       (d)  $1000 \times \blacksquare = \blacksquare$

## Tune Up

Calculate.

- |     |  |     |  |     |  |     |  |     |  |
|-----|--|-----|--|-----|--|-----|--|-----|--|
| (a) | $\begin{array}{r} 37 \\ \times 20 \\ \hline \end{array}$ | (b) | $\begin{array}{r} 54 \\ \times 30 \\ \hline \end{array}$ | (c) | $\begin{array}{r} 48 \\ \times 40 \\ \hline \end{array}$ | (d) | $\begin{array}{r} 56 \\ \times 50 \\ \hline \end{array}$ | (e) | $\begin{array}{r} 72 \\ \times 60 \\ \hline \end{array}$ |
|-----|--|-----|--|-----|--|-----|--|-----|--|
- |     |   |     |   |     |   |     |   |     |   |
|-----|---|-----|---|-----|---|-----|---|-----|---|
| (a) | $\begin{array}{r} 131 \\ \times 40 \\ \hline \end{array}$ | (b) | $\begin{array}{r} 106 \\ \times 80 \\ \hline \end{array}$ | (c) | $\begin{array}{r} 156 \\ \times 20 \\ \hline \end{array}$ | (d) | $\begin{array}{r} 162 \\ \times 20 \\ \hline \end{array}$ | (e) | $\begin{array}{r} 175 \\ \times 30 \\ \hline \end{array}$ |
|-----|---|-----|---|-----|---|-----|---|-----|---|
- |     |   |     |   |     |   |     |   |     |   |
|-----|---|-----|---|-----|---|-----|---|-----|---|
| (a) | $\begin{array}{r} 236 \\ \times 50 \\ \hline \end{array}$ | (b) | $\begin{array}{r} 351 \\ \times 60 \\ \hline \end{array}$ | (c) | $\begin{array}{r} 516 \\ \times 70 \\ \hline \end{array}$ | (d) | $\begin{array}{r} 723 \\ \times 20 \\ \hline \end{array}$ | (e) | $\begin{array}{r} 743 \\ \times 80 \\ \hline \end{array}$ |
|-----|---|-----|---|-----|---|-----|---|-----|---|

# Multiplying in Different Ways

Multiply.

$$\begin{aligned}(3 \times 4) \times 5 \\ = 12 \times 5 \\ = 60\end{aligned}$$

$$\begin{aligned}3 \times (4 \times 5) \\ = 3 \times 20 \\ = 60\end{aligned}$$

$$\begin{aligned}(3 \times 5) \times 4 \\ = 15 \times 4 \\ = 60\end{aligned}$$

The grouping of the factors does not change the product.

## Exercises

Compute.

1. (a)  $(2 \times 5) \times 7$

(b)  $2 \times (5 \times 7)$

(c)  $(2 \times 7) \times 5$

2. (a)  $(5 \times 5) \times 6$

(b)  $5 \times (5 \times 6)$

(c)  $(5 \times 6) \times 5$

3. (a)  $(1 \times 3) \times 4$

(b)  $1 \times (3 \times 4)$

(c)  $(1 \times 4) \times 3$

4. (a)  $(7 \times 1) \times 4$

(b)  $7 \times (1 \times 4)$

(c)  $(7 \times 4) \times 1$

Copy and complete.

5. (a)  $(4 \times 2) \times 6 = \blacksquare \times (2 \times 6)$

(b)  $5 \times (8 \times 3) = (5 \times \blacksquare) \times 3$

6. (a)  $8 \times (4 \times 6) = (8 \times 4) \times \blacksquare$

(b)  $9 \times (3 \times 7) = (9 \times 3) \times \blacksquare$

7. (a)  $(41 \times 6) \times 3 = 41 \times (6 \times \blacksquare)$

(b)  $84 \times (32 \times 6) = (84 \times 32) \times \blacksquare$

Compute.

8. (a)  $74 \times 30$

$30 \times 74$

(b)  $91 \times 3$

$3 \times 91$

9. (a)  $7 \times 5$

$5 \times 7$

(b)  $(3 \times 21) \times 4$

$3 \times (21 \times 4)$

10. (a)  $(16 \times 3) \times 8$

$16 \times (3 \times 8)$

(b)  $(51 \times 3) \times 4$

$(51 \times 4) \times 3$

11. (a)  $(3 \times 401) \times 2$

$(2 \times 3) \times 401$

(b)  $(4 \times 15) \times 3$

$4 \times (15 \times 3)$



# Newspaper Route

Jim delivered 73 newspapers a day.  
How many newspapers did he deliver in 25 d?

Multiply.

$$\begin{array}{r} 73 \\ \times 25 \\ \hline 365 \\ 1460 \\ \hline 1825 \end{array}$$

$5 \times 73 = 365$

$20 \times 73 = 1460$



He delivered 1825 newspapers in 25 d.

## Exercises

Copy and complete.

1.  $\begin{array}{r} 51 \\ \times 19 \\ \hline \end{array}$

■■■ (9 × 51)

■■■ (10 × 51)

■■■

2.  $\begin{array}{r} 37 \\ \times 43 \\ \hline \end{array}$

■■■ (3 × 37)

■■■■ (40 × 37)

■■■■

3. (a)  $\begin{array}{r} 33 \\ \times 52 \\ \hline \end{array}$

(b)  $\begin{array}{r} 62 \\ \times 64 \\ \hline \end{array}$

(c)  $\begin{array}{r} 40 \\ \times 35 \\ \hline \end{array}$

(d)  $\begin{array}{r} 75 \\ \times 23 \\ \hline \end{array}$

4. (a)  $\begin{array}{r} 56 \\ \times 84 \\ \hline \end{array}$

(b)  $\begin{array}{r} 48 \\ \times 37 \\ \hline \end{array}$

(c)  $\begin{array}{r} 72 \\ \times 59 \\ \hline \end{array}$

(d)  $\begin{array}{r} 64 \\ \times 73 \\ \hline \end{array}$

(e)  $\begin{array}{r} 68 \\ \times 25 \\ \hline \end{array}$

5. (a)  $\begin{array}{r} 40 \\ \times 37 \\ \hline \end{array}$

(b)  $\begin{array}{r} 70 \\ \times 23 \\ \hline \end{array}$

(c)  $\begin{array}{r} 90 \\ \times 36 \\ \hline \end{array}$

(d)  $\begin{array}{r} 30 \\ \times 48 \\ \hline \end{array}$

(e)  $\begin{array}{r} 80 \\ \times 61 \\ \hline \end{array}$

6. (a)  $63 \times 58$  (b)  $84 \times 78$  (c)  $53 \times 49$

(d)  $45 \times 61$  (e)  $67 \times 37$

## BRAINTICKLER

Grandfather Maloney said :

My age this year is a multiple of 7.

My age last year was a multiple of 6.

I have lived for more than half a century.

How old am I?

# Basketball Practice

Gina practised 105 free throws a day for 15 d.  
How many free throws did she practise altogether?

Multiply.

$$\begin{array}{r} 105 \\ \times 15 \\ \hline 525 \quad (5 \times 105) \\ 1050 \quad (10 \times 105) \\ \hline 1575 \end{array}$$

She practised 1575 free throws altogether.



## Exercises

Copy and complete.

1.  $\begin{array}{r} 308 \\ \times 36 \\ \hline \end{array}$

■ ■ ■ ■ (6 × 308)  
■ ■ ■ ■ (30 × 308)  
■ ■ ■ ■

2.  $\begin{array}{r} 493 \\ \times 48 \\ \hline \end{array}$

■ ■ ■ ■ (8 × 493)  
■ ■ ■ ■ ■ (40 × 493)  
■ ■ ■ ■ ■

3. (a)  $\begin{array}{r} 643 \\ \times 20 \\ \hline \end{array}$

(b)  $\begin{array}{r} 807 \\ \times 32 \\ \hline \end{array}$

(c)  $\begin{array}{r} 585 \\ \times 76 \\ \hline \end{array}$

(d)  $\begin{array}{r} 700 \\ \times 43 \\ \hline \end{array}$

4. (a)  $\begin{array}{r} 470 \\ \times 85 \\ \hline \end{array}$

(b)  $\begin{array}{r} 607 \\ \times 76 \\ \hline \end{array}$

(c)  $\begin{array}{r} 584 \\ \times 31 \\ \hline \end{array}$

(d)  $\begin{array}{r} 982 \\ \times 65 \\ \hline \end{array}$

(e)  $\begin{array}{r} 407 \\ \times 29 \\ \hline \end{array}$

5. (a)  $\begin{array}{r} 648 \\ \times 50 \\ \hline \end{array}$

(b)  $\begin{array}{r} 881 \\ \times 26 \\ \hline \end{array}$

(c)  $\begin{array}{r} 300 \\ \times 85 \\ \hline \end{array}$

(d)  $\begin{array}{r} 294 \\ \times 36 \\ \hline \end{array}$

(e)  $\begin{array}{r} 446 \\ \times 90 \\ \hline \end{array}$

6. (a)  $\begin{array}{r} \$7.11 \\ \times 38 \\ \hline \end{array}$  Dollars and cents

(b)  $\begin{array}{r} \$3.78 \\ \times 21 \\ \hline \end{array}$

(c)  $\begin{array}{r} \$9.00 \\ \times 87 \\ \hline \end{array}$

(d)  $\begin{array}{r} \$6.58 \\ \times 16 \\ \hline \end{array}$

(e)  $\begin{array}{r} \$8.05 \\ \times 63 \\ \hline \end{array}$

7. (a)  $\begin{array}{r} \$5.99 \\ \times 13 \\ \hline \end{array}$

(b)  $\begin{array}{r} \$9.75 \\ \times 36 \\ \hline \end{array}$

(c)  $\begin{array}{r} \$8.03 \\ \times 84 \\ \hline \end{array}$

(d)  $\begin{array}{r} \$3.00 \\ \times 27 \\ \hline \end{array}$

(e)  $\begin{array}{r} \$7.68 \\ \times 50 \\ \hline \end{array}$

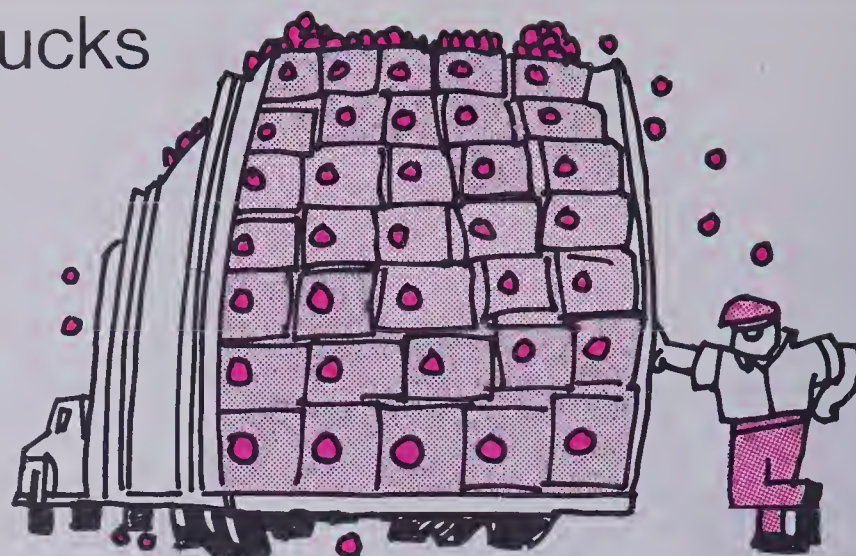
8. Maurice practised 150 free throws every day for 28 d.  
How many free throws altogether?

# Trucks

A truck holds 148 crates of oranges.  
How many crates will 126 trucks hold?

Multiply.

$$\begin{array}{r}
 148 \\
 \times 126 \\
 \hline
 888 \quad (6 \times 148) \\
 2960 \quad (20 \times 148) \\
 14800 \quad (100 \times 148) \\
 \hline
 18648
 \end{array}$$



126 trucks will hold 18 648 crates of oranges.

## Exercises

Copy and complete.

1.  $658 \times 143$

■ ■ ■ ■ (3 × 658)

■ ■ ■ ■ ■ ■ (40 × 658)

■ ■ ■ ■ ■ ■ ■ ■ (100 × 658)

■ ■ ■ ■ ■

2.  $736 \times 342$

1 472 (2 × 736)

29 440 (40 × 736)

■ ■ ■ ■ ■ ■ ■ ■ (300 × 736)

■ ■ ■ ■ ■ ■ ■ ■

4. (a)  $127 \times 340$

5 080 (40 × 127)

38 100 (300 × 127)

43 180

(b)  $659 \times 860$

(c)  $337 \times 490$

(d)  $587 \times 240$

(e)  $541 \times 630$

3. (a)  $205 \times 384$

(b)  $146 \times 449$

(c)  $500 \times 198$

(d)  $740 \times 322$

5. (a)  $556 \times 364$

(b)  $874 \times 419$

(c)  $646 \times 441$

(d)  $382 \times 784$

6. (a)  $\$9.47 \times 324$

(b)  $\$8.76 \times 865$

(c)  $\$7.73 \times 628$

(d)  $\$4.38 \times 480$

(e)  $\$6.61 \times 193$

7. Each truck carries 244 crates of grapefruit.  
How many crates will 319 trucks carry?



# Zeros in the Multiplier

Multiply.

Long way	Short way
$\begin{array}{r} 748 \\ \times 403 \\ \hline 2244 \quad (3 \times 748) \\ 0000 \quad (0 \times 748) \\ 299200 \quad (400 \times 748) \\ \hline 301444 \end{array}$	$\begin{array}{r} 748 \\ \times 403 \\ \hline 2244 \quad (3 \times 748) \\ 299200 \quad (400 \times 748) \\ \hline 301444 \end{array}$

Check by rounding:

$$700 \times 400 = 280\,000$$

Long way	Short way
$\begin{array}{r} 748 \\ \times 4003 \\ \hline 2244 \quad (3 \times 748) \\ 0000 \quad (0 \times 748) \\ 0000 \quad (0 \times 748) \\ 2992000 \quad (4000 \times 748) \\ \hline 2994244 \end{array}$	$\begin{array}{r} 748 \\ \times 4003 \\ \hline 2244 \quad (3 \times 748) \\ 2992000 \quad (4000 \times 748) \\ \hline 2994244 \end{array}$

Check by rounding:

$$700 \times 4000 = 2\,800\,000$$

## Exercises

Calculate. Use the short way. Check by rounding to see if your answer is reasonable.

1. 
$$\begin{array}{r} 385 \\ \times 209 \\ \hline \end{array}$$

$\blacksquare \blacksquare \blacksquare \blacksquare$  (9 × 385)  
 $\blacksquare \blacksquare \blacksquare \blacksquare$  (200 × 385)  
 $\blacksquare \blacksquare \blacksquare \blacksquare$

Check:  $400 \times 200 = \blacksquare$

2. 
$$\begin{array}{r} 468 \\ \times 603 \\ \hline \end{array}$$

$\blacksquare \blacksquare \blacksquare \blacksquare$  (3 × 468)  
 $\blacksquare \blacksquare \blacksquare \blacksquare \blacksquare \blacksquare$  (600 × 468)  
 $\blacksquare \blacksquare \blacksquare \blacksquare \blacksquare \blacksquare$

Check:  $500 \times 600 = \blacksquare$

3. (a) 
$$\begin{array}{r} \$9.37 \\ \times 805 \\ \hline \end{array}$$
 (b) 
$$\begin{array}{r} \$8.20 \\ \times 602 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} \$7.05 \\ \times 304 \\ \hline \end{array}$$
 (d) 
$$\begin{array}{r} \$1.57 \\ \times 601 \\ \hline \end{array}$$

4. (a) 
$$\begin{array}{r} 46 \\ \times 5003 \\ \hline \end{array}$$
 (b) 
$$\begin{array}{r} 38 \\ \times 7006 \\ \hline \end{array}$$
 (c) 
$$\begin{array}{r} 97 \\ \times 3004 \\ \hline \end{array}$$
 (d) 
$$\begin{array}{r} 85 \\ \times 8002 \\ \hline \end{array}$$
 (e) 
$$\begin{array}{r} 49 \\ \times 2007 \\ \hline \end{array}$$

5. (a) 
$$\begin{array}{r} 483 \\ \times 5007 \\ \hline \end{array}$$
 (b) 
$$\begin{array}{r} 984 \\ \times 6002 \\ \hline \end{array}$$
 (c) 
$$\begin{array}{r} 701 \\ \times 4007 \\ \hline \end{array}$$
 (d) 
$$\begin{array}{r} 947 \\ \times 8005 \\ \hline \end{array}$$
 (e) 
$$\begin{array}{r} 389 \\ \times 9005 \\ \hline \end{array}$$

6. (a)  $725 \times 4017$  (b)  $598 \times 3049$  (c)  $805 \times 9048$  (d)  $559 \times 3074$

7. (a)  $492 \times 4105$  (b)  $874 \times 9407$  (c)  $184 \times 3705$  (d)  $384 \times 5604$

# Multiplying Tenths

A library receives a reference set that has 9 books the same size. Each book is 8.3 cm thick. How much shelf space will be needed?

Multiply.

$$\begin{array}{r} 8.3 \\ \times 9 \\ \hline 74.7 \end{array}$$

8.3 ← 1 decimal place  
 × 9 ← 0 decimal places  
 74.7 ← 1 decimal place



74.7 cm of shelf space is needed.

The sum of the number of decimal places in the factors is equal to the number of decimal places in the product.

## Exercises

1. (a)  $\begin{array}{r} 0.4 \\ \times 6 \\ \hline \end{array}$   
 ■.■

(b)  $\begin{array}{r} 0.7 \\ \times 3 \\ \hline \end{array}$   
 ■.■

(c)  $\begin{array}{r} 0.5 \\ \times 4 \\ \hline \end{array}$   
 ■.■

(d)  $\begin{array}{r} 0.7 \\ \times 2 \\ \hline \end{array}$

(e)  $\begin{array}{r} 0.9 \\ \times 5 \\ \hline \end{array}$

2. (a)  $7 \times 0.2$

(b)  $3 \times 0.8$

(c)  $6 \times 0.1$

(d)  $8 \times 0.6$

3. (a)  $\begin{array}{r} 6.3 \\ \times 4 \\ \hline \end{array}$   
 ■■■■

(b)  $\begin{array}{r} 9.7 \\ \times 6 \\ \hline \end{array}$

(c)  $\begin{array}{r} 4.8 \\ \times 2 \\ \hline \end{array}$

(d)  $\begin{array}{r} 8.7 \\ \times 5 \\ \hline \end{array}$

(e)  $\begin{array}{r} 1.3 \\ \times 9 \\ \hline \end{array}$

4. (a)  $4 \times 5.1$

(b)  $8 \times 6.3$

(c)  $3 \times 2.7$

(d)  $1 \times 5.8$

(e)  $7 \times 3.8$

5. (a)  $\begin{array}{r} 26.5 \\ \times 3 \\ \hline \end{array}$   
 ■■■■

(b)  $\begin{array}{r} 88.7 \\ \times 4 \\ \hline \end{array}$

(c)  $\begin{array}{r} 37.1 \\ \times 6 \\ \hline \end{array}$

(d)  $\begin{array}{r} 50.8 \\ \times 7 \\ \hline \end{array}$

(e)  $\begin{array}{r} 93.9 \\ \times 5 \\ \hline \end{array}$

6. (a)  $7 \times 64.9$

(b)  $4 \times 83.7$

(c)  $8 \times 30.2$

(d)  $1 \times 98.7$

7. (a)  $237.4 \times 6$

(b)  $489.6 \times 2$

(c)  $207.4 \times 8$

(d)  $321.8 \times 4$

8. (a)  $4 \times 312.7$

(b)  $9 \times 400.5$

(c)  $1 \times 857.6$

(d)  $3 \times 805.6$

9. One book is 3.8 cm thick.  
How thick are 8 books?

10. A shelf is 32.4 cm high.  
How high are 5 shelves?

# Multiplying Hundredths

A bicycle wheel travels 2.32 m in one turn.

How far will it travel in 9 turns?

Multiply.

$$\begin{array}{r} 2.32 \\ \times 9 \\ \hline 20.88 \end{array}$$

2 decimal places  
0 decimal places  
2 decimal places



It travels 20.88 m in 9 turns.

The sum of the number of decimal places in the factors is equal to the number of decimal places in the product.

## Exercises

1. (a)  $\begin{array}{r} \$0.75 \\ \times 3 \\ \hline \end{array}$   
\$■.■■

(b)  $\begin{array}{r} \$0.84 \\ \times 7 \\ \hline \end{array}$   
\$■.■■

(c)  $\begin{array}{r} \$0.68 \\ \times 7 \\ \hline \end{array}$

(d)  $\begin{array}{r} \$0.37 \\ \times 9 \\ \hline \end{array}$

(e)  $\begin{array}{r} \$0.48 \\ \times 6 \\ \hline \end{array}$

2. (a)  $\begin{array}{r} 0.68 \\ \times 3 \\ \hline \end{array}$

(b)  $\begin{array}{r} 0.63 \\ \times 7 \\ \hline \end{array}$

(c)  $\begin{array}{r} 0.79 \\ \times 5 \\ \hline \end{array}$

(d)  $\begin{array}{r} 0.84 \\ \times 6 \\ \hline \end{array}$

(e)  $\begin{array}{r} 0.12 \\ \times 9 \\ \hline \end{array}$

3. (a)  $\begin{array}{r} \$4.68 \\ \times 4 \\ \hline \end{array}$

(b)  $\begin{array}{r} \$3.05 \\ \times 8 \\ \hline \end{array}$

(c)  $\begin{array}{r} \$9.61 \\ \times 7 \\ \hline \end{array}$

(d)  $\begin{array}{r} \$8.35 \\ \times 4 \\ \hline \end{array}$

(e)  $\begin{array}{r} \$6.00 \\ \times 3 \\ \hline \end{array}$

4. (a)  $\begin{array}{r} 6.39 \\ \times 6 \\ \hline \end{array}$

(b)  $\begin{array}{r} 8.02 \\ \times 5 \\ \hline \end{array}$

(c)  $\begin{array}{r} 9.8 \\ \times 3 \\ \hline \end{array}$

(d)  $\begin{array}{r} 8.17 \\ \times 5 \\ \hline \end{array}$

(e)  $\begin{array}{r} 4.63 \\ \times 8 \\ \hline \end{array}$

5. (a)  $\begin{array}{r} 46.31 \\ \times 7 \\ \hline \end{array}$

(b)  $\begin{array}{r} 39.06 \\ \times 3 \\ \hline \end{array}$

(c)  $\begin{array}{r} 98.17 \\ \times 7 \\ \hline \end{array}$

(d)  $\begin{array}{r} 30.95 \\ \times 6 \\ \hline \end{array}$

(e)  $\begin{array}{r} 88.96 \\ \times 5 \\ \hline \end{array}$

6. (a)  $3 \times 27.38$  (b)  $0.9 \times 35.6$  (c)  $4 \times 31.05$  (d)  $2 \times 48.2$

7. (a)  $6 \times \$317.62$  (b)  $8 \times \$419.05$  (c)  $5 \times \$371.00$

8. One small tree costs \$19.95.  
How much would 7 trees cost?

9. A bicycle wheel travels 2.68 m in one turn.  
How far will it travel in 8 turns?



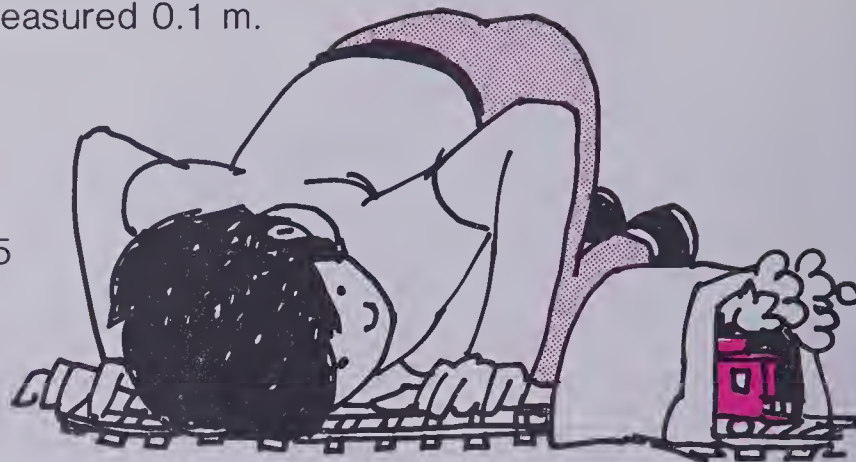
# Model Railway

One piece of track on Doug's model railway measured 0.1 m.  
He laid 15 pieces of track end to end.  
How long was the track?

There are two ways to multiply:

$$\begin{array}{r}
 15 \times 0.1 \\
 \downarrow \\
 0.1 \\
 \times 15 \\
 \hline
 05 \\
 10 \\
 \hline
 1.5
 \end{array}
 \quad
 \begin{array}{r}
 0.1 \times 15 \\
 \downarrow \\
 15 \\
 \times 0.1 \\
 \hline
 1.5
 \end{array}$$

1 decimal place → 1 decimal place



His track was 1.5 m long.  
Which way was easier?

## Exercises

1. (a)  $\begin{array}{r} 4 \\ \times 0.1 \\ \hline \end{array}$

(b)  $\begin{array}{r} 9 \\ \times 0.1 \\ \hline \end{array}$

(c)  $\begin{array}{r} 7 \\ \times 0.1 \\ \hline \end{array}$

(d)  $\begin{array}{r} 3 \\ \times 0.1 \\ \hline \end{array}$

(e)  $\begin{array}{r} 6 \\ \times 0.1 \\ \hline \end{array}$

2. (a)  $0.1 \times 8$

(b)  $0.1 \times 5$

(c)  $0.1 \times 2$

(d)  $0.1 \times 1$

3. (a)  $\begin{array}{r} 17 \\ \times 0.1 \\ \hline \end{array}$

(b)  $\begin{array}{r} 28 \\ \times 0.1 \\ \hline \end{array}$

(c)  $\begin{array}{r} 95 \\ \times 0.1 \\ \hline \end{array}$

(d)  $\begin{array}{r} 71 \\ \times 0.1 \\ \hline \end{array}$

(e)  $\begin{array}{r} 34 \\ \times 0.1 \\ \hline \end{array}$

4. (a)  $\begin{array}{r} 237 \\ \times 0.1 \\ \hline \end{array}$

(b)  $\begin{array}{r} 448 \\ \times 0.1 \\ \hline \end{array}$

(c)  $\begin{array}{r} 205 \\ \times 0.1 \\ \hline \end{array}$

(d)  $\begin{array}{r} 446 \\ \times 0.1 \\ \hline \end{array}$

(e)  $\begin{array}{r} 517 \\ \times 0.1 \\ \hline \end{array}$

5. (a)  $0.1 \times 215$

(b)  $0.1 \times 364$

(c)  $0.1 \times 912$

(d)  $0.1 \times 603$

6. (a)  $\begin{array}{r} 4832 \\ \times 0.1 \\ \hline \end{array}$

(b)  $\begin{array}{r} 6258 \\ \times 0.1 \\ \hline \end{array}$

(c)  $\begin{array}{r} 7682 \\ \times 0.1 \\ \hline \end{array}$

(d)  $\begin{array}{r} 4235 \\ \times 0.1 \\ \hline \end{array}$

7. One length of track is 0.1 m long.

How long are (a) 35 lengths of track? (b) 412 lengths of track?

# Bicycle Rides

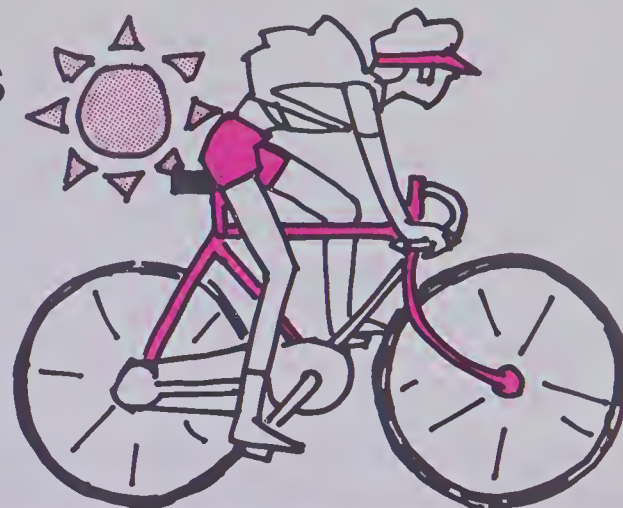
Kevin rode his bicycle 175 km during the summer.  
Joe rode his bicycle seven tenths of Kevin's distance.  
How far did Joe ride his bicycle?

Joe rode 0.7 of 175 km  
=  $0.7 \times 175$  km  
= 122.5 km

175 ← 0 decimal places  
 $\times 0.7$  ← 1 decimal place  

---

122.5 ← 1 decimal place



## Exercises

1. (a)  $\begin{array}{r} 6 \\ \times 0.4 \\ \hline \end{array}$  (b)  $\begin{array}{r} 5 \\ \times 0.7 \\ \hline \end{array}$  (c)  $\begin{array}{r} 8 \\ \times 0.6 \\ \hline \end{array}$  (d)  $\begin{array}{r} 9 \\ \times 0.3 \\ \hline \end{array}$  (e)  $\begin{array}{r} 7 \\ \times 0.5 \\ \hline \end{array}$

2. (a)  $\begin{array}{r} 27 \\ \times 0.6 \\ \hline \end{array}$  (b)  $\begin{array}{r} 93 \\ \times 0.4 \\ \hline \end{array}$  (c)  $\begin{array}{r} 85 \\ \times 0.7 \\ \hline \end{array}$  (d)  $\begin{array}{r} 69 \\ \times 0.9 \\ \hline \end{array}$  (e)  $\begin{array}{r} 52 \\ \times 0.1 \\ \hline \end{array}$

3. (a)  $0.3 \times 47$  (b)  $0.6 \times 85$  (c)  $0.7 \times 49$  (d)  $0.5 \times 61$

4. (a)  $\begin{array}{r} 467 \\ \times 0.4 \\ \hline \end{array}$  (b)  $\begin{array}{r} 987 \\ \times 0.4 \\ \hline \end{array}$  (c)  $\begin{array}{r} 405 \\ \times 0.7 \\ \hline \end{array}$  (d)  $\begin{array}{r} 982 \\ \times 0.8 \\ \hline \end{array}$  (e)  $\begin{array}{r} 853 \\ \times 0.5 \\ \hline \end{array}$

5. (a)  $\begin{array}{r} 4832 \\ \times 0.4 \\ \hline \end{array}$  (b)  $\begin{array}{r} 5937 \\ \times 0.8 \\ \hline \end{array}$  (c)  $\begin{array}{r} 6502 \\ \times 0.9 \\ \hline \end{array}$  (d)  $\begin{array}{r} 3517 \\ \times 0.2 \\ \hline \end{array}$  (e)  $\begin{array}{r} 9881 \\ \times 0.6 \\ \hline \end{array}$

6. (a)  $\begin{array}{r} 87\ 432 \\ \times 0.4 \\ \hline \end{array}$  (b)  $\begin{array}{r} 92\ 411 \\ \times 0.3 \\ \hline \end{array}$  (c)  $\begin{array}{r} 49\ 027 \\ \times 0.5 \\ \hline \end{array}$  (d)  $\begin{array}{r} 38\ 419 \\ \times 0.9 \\ \hline \end{array}$  (e)  $\begin{array}{r} 13\ 950 \\ \times 0.6 \\ \hline \end{array}$

7. Chris rode his bicycle 120 km.  
Yvonne rode hers eight tenths of Chris' distance.  
How far did she ride?

8. Gloria rode 86 km on her ten-speed bike.  
Marcos went only four tenths of her distance.  
How far did he ride?

# Daily Chores

On Saturday, Tim washed the supper dishes in 25 min.  
Tina took 1.5 times as long to do them on Sunday.  
How many minutes did she take?



Multiply.

$$\begin{array}{r} 25 \leftarrow 0 \text{ decimal places} \\ \times 1.5 \leftarrow 1 \text{ decimal place} \\ \hline \end{array}$$

125

250

$$\begin{array}{r} 37.5 \leftarrow 1 \text{ decimal place} \end{array}$$

She took 37.5 min.

## Exercises

Calculate.

1. (a)  $\begin{array}{r} 68 \\ \times 1.7 \\ \hline \end{array}$

■■■

■■■

■■■■.■

(b)  $\begin{array}{r} 26 \\ \times 3.4 \\ \hline \end{array}$

(d)  $\begin{array}{r} 60 \\ \times 7.2 \\ \hline \end{array}$

(c)  $\begin{array}{r} 85 \\ \times 5.8 \\ \hline \end{array}$

(e)  $\begin{array}{r} 27 \\ \times 2.6 \\ \hline \end{array}$

2. (a)  $7.6 \times 29$

(b)  $1.3 \times 84$

(c)  $4.5 \times 71$

(d)  $8.1 \times 32$

3. (a)  $\begin{array}{r} 485 \\ \times 8.1 \\ \hline \end{array}$

(b)  $\begin{array}{r} 602 \\ \times 5.8 \\ \hline \end{array}$

(c)  $\begin{array}{r} 596 \\ \times 4.7 \\ \hline \end{array}$

(d)  $\begin{array}{r} 811 \\ \times 3.9 \\ \hline \end{array}$

(e)  $\begin{array}{r} 140 \\ \times 3.5 \\ \hline \end{array}$

4. (a)  $6.8 \times 4276$

(b)  $9.1 \times 6035$

(c)  $3.7 \times 4270$

(d)  $2.3 \times 6915$

5. (a)  $\begin{array}{r} 583 \\ \times 27.4 \\ \hline \end{array}$

(b)  $\begin{array}{r} 462 \\ \times 33.1 \\ \hline \end{array}$

(c)  $\begin{array}{r} 329 \\ \times 40.6 \\ \hline \end{array}$

(d)  $\begin{array}{r} 517 \\ \times 31.4 \\ \hline \end{array}$

(e)  $\begin{array}{r} 730 \\ \times 65.1 \\ \hline \end{array}$

6. (a)  $\begin{array}{r} 2407 \\ \times 3.4 \\ \hline \end{array}$

(b)  $\begin{array}{r} 6829 \\ \times 2.6 \\ \hline \end{array}$

(c)  $\begin{array}{r} 8160 \\ \times 3.4 \\ \hline \end{array}$

(d)  $\begin{array}{r} 3842 \\ \times 2.8 \\ \hline \end{array}$

(e)  $\begin{array}{r} 8563 \\ \times 4.5 \\ \hline \end{array}$

7. Karen worked 12 h at the gas station.  
Gail worked 3.6 times as long.  
How many hours did Gail work?

8. Lois cleaned her room in 44 min.  
Gary took 2.4 times as long.  
How long did Gary take?



# Hundredths and Thousandths

Multiply.

$$\begin{array}{r} 95 \\ \times 0.1 \\ \hline 9.5 \end{array}$$

0 decimal places  
1 decimal place  
1 decimal place

$$\begin{array}{r} 95 \\ \times 0.01 \\ \hline 0.95 \end{array}$$

0 decimal places  
2 decimal places  
2 decimal places

$$\begin{array}{r} 395 \\ \times 0.001 \\ \hline 0.395 \end{array}$$

0 decimal places  
3 decimal places  
3 decimal places

The sum of the number of decimal places in the factors is equal to the number of decimal places in the product.

## Exercises

1. (a) 
$$\begin{array}{r} 57 \\ \times 0.01 \\ \hline \end{array}$$

0 decimal places  
2 decimal places  
2 decimal places

(b) 
$$\begin{array}{r} 63 \\ \times 0.01 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 48 \\ \times 0.01 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 83 \\ \times 0.01 \\ \hline \end{array}$$

2. (a)  $0.01 \times 49$

(b)  $0.01 \times 97$

(c)  $0.01 \times 56$

(d)  $0.01 \times 39$

3. (a)  $0.01 \times 483$

(b)  $0.01 \times 857$

(c)  $0.01 \times 924$

(d)  $0.01 \times 684$

4. (a) 
$$\begin{array}{r} 83 \\ \times 0.001 \\ \hline \end{array}$$

0 decimal places  
3 decimal places  
3 decimal places

(b) 
$$\begin{array}{r} 65 \\ \times 0.001 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 96 \\ \times 0.001 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 55 \\ \times 0.001 \\ \hline \end{array}$$

5. (a) 
$$\begin{array}{r} 834 \\ \times 0.001 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 208 \\ \times 0.001 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 769 \\ \times 0.001 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 153 \\ \times 0.001 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 429 \\ \times 0.001 \\ \hline \end{array}$$

6. (a)  $0.001 \times 7491$

(b)  $0.001 \times 4685$

(c)  $0.001 \times 4876$

(d)  $0.001 \times 5876$

(e)  $0.001 \times 3471$

(f)  $0.001 \times 2008$

# Multiplying by Hundredths

Multiply.

$$\begin{array}{r} 18 \quad \leftarrow 0 \text{ decimal places} \\ \times 0.48 \quad \leftarrow 2 \text{ decimal places} \\ \hline 144 \\ 720 \\ \hline 8.64 \quad \leftarrow 2 \text{ decimal places} \end{array}$$

$$\begin{array}{r} 63 \quad \leftarrow 0 \text{ decimal places} \\ \times 2.47 \quad \leftarrow 2 \text{ decimal places} \\ \hline 441 \\ 2520 \\ 12600 \\ \hline 155.61 \quad \leftarrow 2 \text{ decimal places} \end{array}$$

## Exercises

Copy and complete.

1.  $0.25 \times 19$  There are     decimal places in the product.

2.  $0.57 \times 536$  There are     decimal places in the product.

3. (a) 
$$\begin{array}{r} 19 \\ \times 0.12 \\ \hline \end{array}$$

■ ■  
■ ■ ■  
■ ■ ■

(b) 
$$\begin{array}{r} 27 \\ \times 0.37 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 43 \\ \times 0.48 \\ \hline \end{array}$$

4. (a)  $2.42 \times 25$  (b)  $0.49 \times 13$

(c)  $7.41 \times 26$  (d)  $4.97 \times 38$

(d) 
$$\begin{array}{r} 14 \\ \times 0.56 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 19 \\ \times 0.52 \\ \hline \end{array}$$

5. (a) 
$$\begin{array}{r} 27 \\ \times 3.42 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 38 \\ \times 1.36 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 45 \\ \times 6.27 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 84 \\ \times 8.41 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 51 \\ \times 2.59 \\ \hline \end{array}$$

6. (a)  $4.52 \times 85$

(b)  $6.76 \times 41$

(c)  $0.95 \times 73$

(d)  $8.64 \times 49$

7. (a) 
$$\begin{array}{r} 835 \\ \times 2.81 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 902 \\ \times 0.59 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 685 \\ \times 5.37 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 418 \\ \times 1.74 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 853 \\ \times 0.85 \\ \hline \end{array}$$

8. (a) 
$$\begin{array}{r} 4873 \\ \times 0.45 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 8321 \\ \times 0.68 \\ \hline \end{array}$$

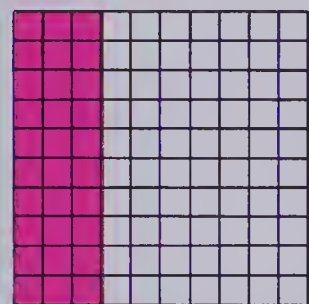
(c) 
$$\begin{array}{r} 5382 \\ \times 0.76 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 6350 \\ \times 0.78 \\ \hline \end{array}$$

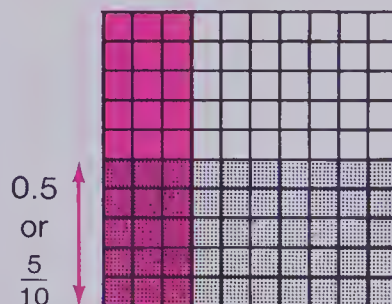
(e) 
$$\begin{array}{r} 9476 \\ \times 4.53 \\ \hline \end{array}$$

# Multiplying Tenths

Multiply  $0.3 \times 0.5$ .



$0.3$  or  $\frac{3}{10}$



$0.5$   
or  
 $\frac{5}{10}$

$0.3$

$0.5$  ← 1 decimal place  
 $\times 0.3$  ← 1 decimal place  

---

 $0.15$  ← 2 decimal places

$$0.3 \times 0.5 = 0.15$$

three tenths  $\times$  five tenths = fifteen hundredths

The sum of the number of decimal places in the factors is equal to the number of decimal places in the product.

## Exercises

Multiply.

1. (a) 
$$\begin{array}{r} 0.7 \\ \times 0.4 \\ \hline \end{array}$$

■.■■■

(b) 
$$\begin{array}{r} 0.6 \\ \times 0.3 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 0.5 \\ \times 0.2 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 0.8 \\ \times 0.7 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 0.9 \\ \times 0.2 \\ \hline \end{array}$$

2. (a)  $0.1 \times 0.4$

(b)  $0.2 \times 0.3$

(c)  $0.8 \times 0.1$

(d)  $0.3 \times 0.3$

(e)  $0.2 \times 0.4$

3. (a) 
$$\begin{array}{r} 17.1 \\ \times 0.5 \\ \hline \end{array}$$

■.■■■

(b) 
$$\begin{array}{r} 6.7 \\ \times 0.3 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 9.5 \\ \times 0.6 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 8.2 \\ \times 0.1 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 5.1 \\ \times 0.9 \\ \hline \end{array}$$

4. (a) 
$$\begin{array}{r} 36.5 \\ \times 0.3 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 91.7 \\ \times 0.8 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 82.4 \\ \times 0.8 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 60.3 \\ \times 0.3 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 95.9 \\ \times 0.9 \\ \hline \end{array}$$

## BRAINTICKLER

Find the rule:

When Jim said 10, Tom said 1.

When Jim said 5, Tom said one half.

When Jim said 1, Tom said one tenth.



# More Decimal Multiplication

Multiply.

$$\begin{array}{r} 3.4 \leftarrow 1 \text{ decimal place} \\ \times 1.4 \leftarrow 1 \text{ decimal place} \\ \hline 136 \\ 340 \\ \hline 4.76 \leftarrow 2 \text{ decimal places} \end{array}$$

$$\begin{array}{r} 13.2 \leftarrow 1 \text{ decimal place} \\ \times 3.5 \leftarrow 1 \text{ decimal place} \\ \hline 660 \\ 3960 \\ \hline 46.20 \leftarrow 2 \text{ decimal places} \end{array}$$

$$\begin{array}{r} 476.7 \leftarrow 1 \text{ decimal place} \\ \times 3.1 \leftarrow 1 \text{ decimal place} \\ \hline 4767 \\ 143010 \\ \hline 1477.77 \leftarrow 2 \text{ decimal places} \end{array}$$

## Exercises

1. (a) 
$$\begin{array}{r} 4.6 \\ \times 3.2 \\ \hline \end{array}$$

■ ■  
■ ■ ■ ■  
■ ■ ■ ■

(b) 
$$\begin{array}{r} 9.5 \\ \times 4.1 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 9.5 \\ \times 8.1 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 6.6 \\ \times 5.8 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 4.9 \\ \times 5.9 \\ \hline \end{array}$$

2. (a)  $8.6 \times 4.3$

(c)  $7.5 \times 1.1$

(b)  $5.2 \times 3.8$

(d)  $3.7 \times 2.9$

3. (a) 
$$\begin{array}{r} 12.6 \\ \times 5.8 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 43.9 \\ \times 2.7 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 65.1 \\ \times 4.3 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 80.7 \\ \times 6.1 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 39.4 \\ \times 3.8 \\ \hline \end{array}$$

4. (a)  $3.3 \times 48.6$

(b)  $5.4 \times 53.9$

(c)  $8.7 \times 35.2$

(d)  $7.1 \times 82.6$

5. (a) 
$$\begin{array}{r} 397.5 \\ \times 6.2 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 402.8 \\ \times 3.1 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 981.3 \\ \times 9.5 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 702.8 \\ \times 5.5 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 991.2 \\ \times 4.6 \\ \hline \end{array}$$

6. (a)  $4.7 \times 760.5$

(b)  $9.3 \times 581.4$

(c)  $6.5 \times 800.4$

Calculate. Compare the answers in each pair.

7. (a)  $2 \times (3.1 + 1.4)$   
(b)  $2 \times 3.1 + 2 \times 1.4$

8. (a)  $4 \times (5.2 + 6.7)$   
(b)  $4 \times 5.2 + 4 \times 6.7$

9. (a)  $1.3 \times (2.1 + 3.2)$   
(b)  $1.3 \times 2.1 + 1.3 \times 3.2$

10. (a)  $3.2 \times (1.5 + 4.6)$   
(b)  $3.2 \times 1.5 + 3.2 \times 4.6$

Remember:  
1st. Do operations  
in brackets.  
2nd. Do multiplication  
then addition.

# Multiplying Two Decimal Numbers

Multiply.

$$\begin{array}{r} 27.3 \leftarrow 1 \text{ decimal place} \\ \times 2.27 \leftarrow 2 \text{ decimal places} \\ \hline 1911 \\ 5460 \\ 54600 \\ \hline \end{array}$$

$$61.971 \leftarrow 3 \text{ decimal places}$$

Check by rounding  $2 \times 30 = 60$ .

$$\begin{array}{r} 9.32 \leftarrow 2 \text{ decimal places} \\ \times 1.16 \leftarrow 2 \text{ decimal places} \\ \hline 5592 \\ 9320 \\ 93200 \\ \hline \end{array}$$

$$10.8112 \leftarrow 4 \text{ decimal places}$$

Check by rounding  $1 \times 9 = 9$ .

## Exercises

1. How many decimal places in each?

(a) 32.3

(b) 4.175

(c) 234.58

(d) 0.001

(e) 5.7684

2. Calculate. Check by rounding.

(a)  $\begin{array}{r} 38.4 \\ \times 2.76 \\ \hline \end{array}$  Check:  $\begin{array}{r} 40 \\ \times 3 \\ \hline \end{array}$

(b)  $\begin{array}{r} 74.7 \\ \times 4.35 \\ \hline \end{array}$  Check:  $\begin{array}{r} 70 \\ \times 4 \\ \hline \end{array}$

(c)  $\begin{array}{r} 85.3 \\ \times 6.28 \\ \hline \end{array}$

(d)  $\begin{array}{r} 93.6 \\ \times 2.17 \\ \hline \end{array}$

3. (a)  $\begin{array}{r} 45.73 \\ \times 2.36 \\ \hline \end{array}$

(b)  $\begin{array}{r} 64.85 \\ \times 0.14 \\ \hline \end{array}$

(c)  $\begin{array}{r} 14.63 \\ \times 5.61 \\ \hline \end{array}$

(d)  $\begin{array}{r} 76.58 \\ \times 4.45 \\ \hline \end{array}$

(e)  $\begin{array}{r} 43.37 \\ \times 6.06 \\ \hline \end{array}$

(f)  $5.92 \times 60.49$

(g)  $3.08 \times 94.17$

(h)  $0.63 \times 27.14$

4. (a)  $6.35 \times 4.58$

(b)  $76.3 \times 1.86$

(c)  $5.09 \times 175.4$

(d)  $6.42 \times 5.37$

(e)  $3.01 \times 9.75$

(f)  $8.17 \times 2.01$

5. (a)  $\begin{array}{r} 1.3 \\ \times 15.37 \\ \hline \end{array}$

(b)  $\begin{array}{r} 4.27 \\ \times 10.75 \\ \hline \end{array}$

(c)  $\begin{array}{r} 6.83 \\ \times 27.62 \\ \hline \end{array}$

(d)  $\begin{array}{r} 5.08 \\ \times 72.97 \\ \hline \end{array}$

(e)  $\begin{array}{r} 63.4 \\ \times 40.91 \\ \hline \end{array}$

# More Decimal Places

Multiply.

$$\begin{array}{r} 382 \leftarrow 0 \text{ decimal places} \\ \times 0.476 \leftarrow 3 \text{ decimal places} \\ \hline \end{array}$$

$$\begin{array}{r} 2\ 292 \\ 26\ 740 \\ 152\ 800 \\ \hline \end{array}$$

$$181.832 \leftarrow 3 \text{ decimal places}$$

$$\begin{array}{r} 94.3 \leftarrow 1 \text{ decimal place} \\ \times 0.1763 \leftarrow 4 \text{ decimal places} \\ \hline \end{array}$$

$$\begin{array}{r} 2\ 829 \\ 56\ 580 \\ 660\ 100 \\ 943\ 000 \\ \hline \end{array}$$

$$16.625\ 09 \leftarrow 5 \text{ decimal places}$$

## Exercises

1. (a)  $\begin{array}{r} 82 \\ \times 0.001 \\ \hline \end{array}$

(b)  $\begin{array}{r} 57 \\ \times 0.014 \\ \hline \end{array}$

(c)  $\begin{array}{r} 385 \\ \times 0.407 \\ \hline \end{array}$

(d)  $\begin{array}{r} 902 \\ \times 0.239 \\ \hline \end{array}$

(e)  $\begin{array}{r} 4483 \\ \times 0.746 \\ \hline \end{array}$

2. (a)  $\begin{array}{r} 37 \\ \times 0.0761 \\ \hline \end{array}$

(b)  $\begin{array}{r} 85 \\ \times 0.1358 \\ \hline \end{array}$

(c)  $\begin{array}{r} 368 \\ \times 0.2074 \\ \hline \end{array}$

(d)  $\begin{array}{r} 485 \\ \times 0.0003 \\ \hline \end{array}$

(e)  $\begin{array}{r} 8563 \\ \times 0.0261 \\ \hline \end{array}$

3. (a)  $\begin{array}{r} 48 \\ \times 4.176 \\ \hline \end{array}$

(b)  $\begin{array}{r} 25 \\ \times 6.284 \\ \hline \end{array}$

(c)  $\begin{array}{r} 603 \\ \times 8.481 \\ \hline \end{array}$

(d)  $\begin{array}{r} 764 \\ \times 2.702 \\ \hline \end{array}$

(e)  $\begin{array}{r} 946 \\ \times 5.817 \\ \hline \end{array}$

4. (a)  $13.74 \times 0.762$  (b)  $26.51 \times 8.108$  (c)  $81.04 \times 9.121$  (d)  $60.43 \times 0.009$

5. (a)  $5.3 \times 0.4009$  (b)  $7.5 \times 0.0174$  (c)  $46.5 \times 2.1605$  (d)  $13.7 \times 4.1267$

## BRAINTICKLER

Multiply 37 by each of these numbers: 3, 6, 9, 12.  
Your products will be interesting. Three more numbers  
larger than 12 continue the pattern. What are they?





# Tune Up

Calculate.

1. (a)  $9 \times 7$  (b)  $3 \times 8$  (c)  $6 \times 0$  (d)  $7 \times 5$  (e)  $4 \times 9$
2. (a)  $3 \times 14$  (b)  $9 \times 28$  (c)  $7 \times 65$  (d)  $1 \times 84$  (e)  $6 \times 93$
3. (a)  $23 \times 47$  (b)  $25 \times 87$  (c)  $68 \times 41$  (d)  $51 \times 32$  (e)  $35 \times 13$
4. (a)  $78 \times 448$  (b)  $87 \times 379$  (c)  $35 \times 107$  (d)  $29 \times \$2.83$  (e)  $84 \times \$9.13$
5. (a)  $205 \times 876$  (b)  $632 \times 449$  (c)  $902 \times 817$  (d)  $430 \times 259$  (e)  $106 \times 365$
6. (a)  $10 \times 64$  (b)  $100 \times 83$  (c)  $1 \times \$8.37$  (d)  $1000 \times \$6.82$

Calculate. Compare the answers in each pair.

7. (a)  $7 \times 6 = 42$  (b)  $6 \times 7$
8. (a)  $15 \times 3$  (b)  $3 \times 15$
9. (a)  $100 \times 56$  (b)  $56 \times 100$
10. (a)  $6 \times (2.3 + 1.9)$  (b)  $6 \times 2.3 + 6 \times 1.9$
11. (a)  $4 \times (3.7 + 2.6)$  (b)  $4 \times 3.7 + 4 \times 2.6$
12. (a)  $1.8 \times (0.5 + 3.7)$  (b)  $1.8 \times 0.5 + 1.8 \times 3.7$
13. (a)  $7.1 \times (3.3 + 1.0)$  (b)  $7.1 \times 3.3 + 7.1 \times 1.0$

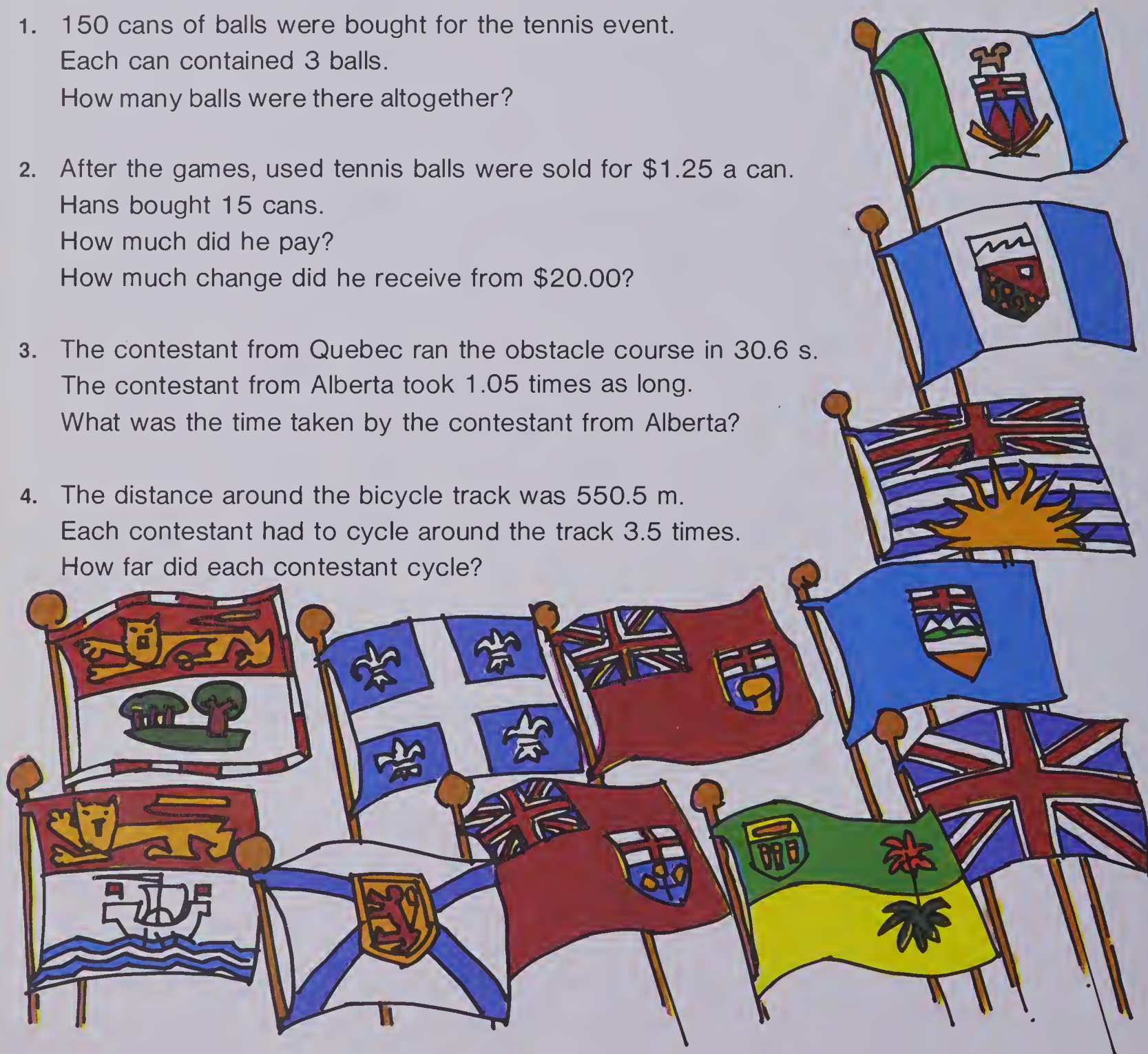
Calculate.

14. (a)  $2 \times \$7.34$  (b)  $6 \times \$3.75$  (c)  $3 \times \$27.48$  (d)  $5 \times \$352.15$
15. (a)  $0.1 \times 25$  (b)  $0.4 \times 583$  (c)  $0.7 \times 351$  (d)  $0.6 \times 7685$
16. (a)  $4.8 \times 97$  (b)  $6.7 \times 387$  (c)  $4.5 \times 596$  (d)  $3.8 \times 3852$
17. (a)  $0.01 \times 3$  (b)  $0.001 \times 481$  (c)  $0.01 \times 582$  (d)  $0.001 \times 693$
18. (a)  $4.76 \times 7$  (b)  $6.85 \times 93$  (c)  $0.76 \times 4735$  (d)  $3.03 \times 517$
19. (a)  $0.9 \times 0.5$  (b)  $0.5 \times 4.6$  (c)  $0.4 \times 60.5$  (d)  $0.7 \times 99.6$
20. (a)  $5.7 \times 6.8$  (b)  $7.3 \times 30.7$  (c)  $8.1 \times 573.7$  (d)  $6.2 \times 600.8$
21. (a)  $3.56 \times 16.4$  (b)  $1.67 \times 13.7$  (c)  $5.01 \times 26.43$  (d)  $2.76 \times 10.71$

# Canada Games

Contestants from all the provinces were gathered to compete in a variety of events.

1. 150 cans of balls were bought for the tennis event.  
Each can contained 3 balls.  
How many balls were there altogether?
2. After the games, used tennis balls were sold for \$1.25 a can.  
Hans bought 15 cans.  
How much did he pay?  
How much change did he receive from \$20.00?
3. The contestant from Quebec ran the obstacle course in 30.6 s.  
The contestant from Alberta took 1.05 times as long.  
What was the time taken by the contestant from Alberta?
4. The distance around the bicycle track was 550.5 m.  
Each contestant had to cycle around the track 3.5 times.  
How far did each contestant cycle?



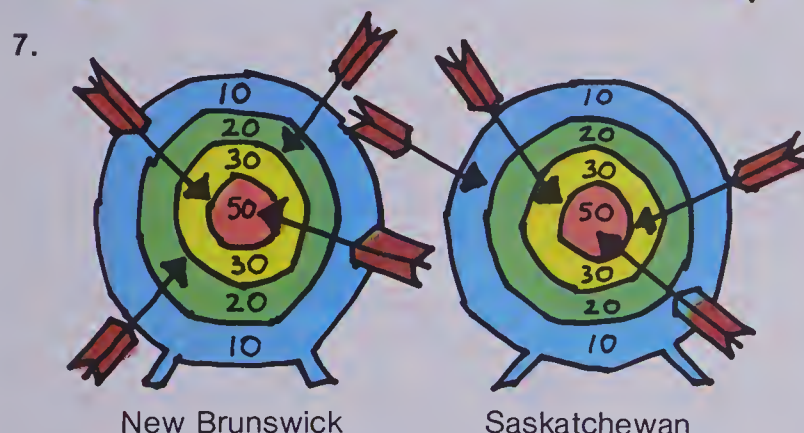


5. There were rows of seats for spectators to watch the swimming event.  
There were 435 rows.  
Each row had 26 seats.  
How many seats altogether?

6.

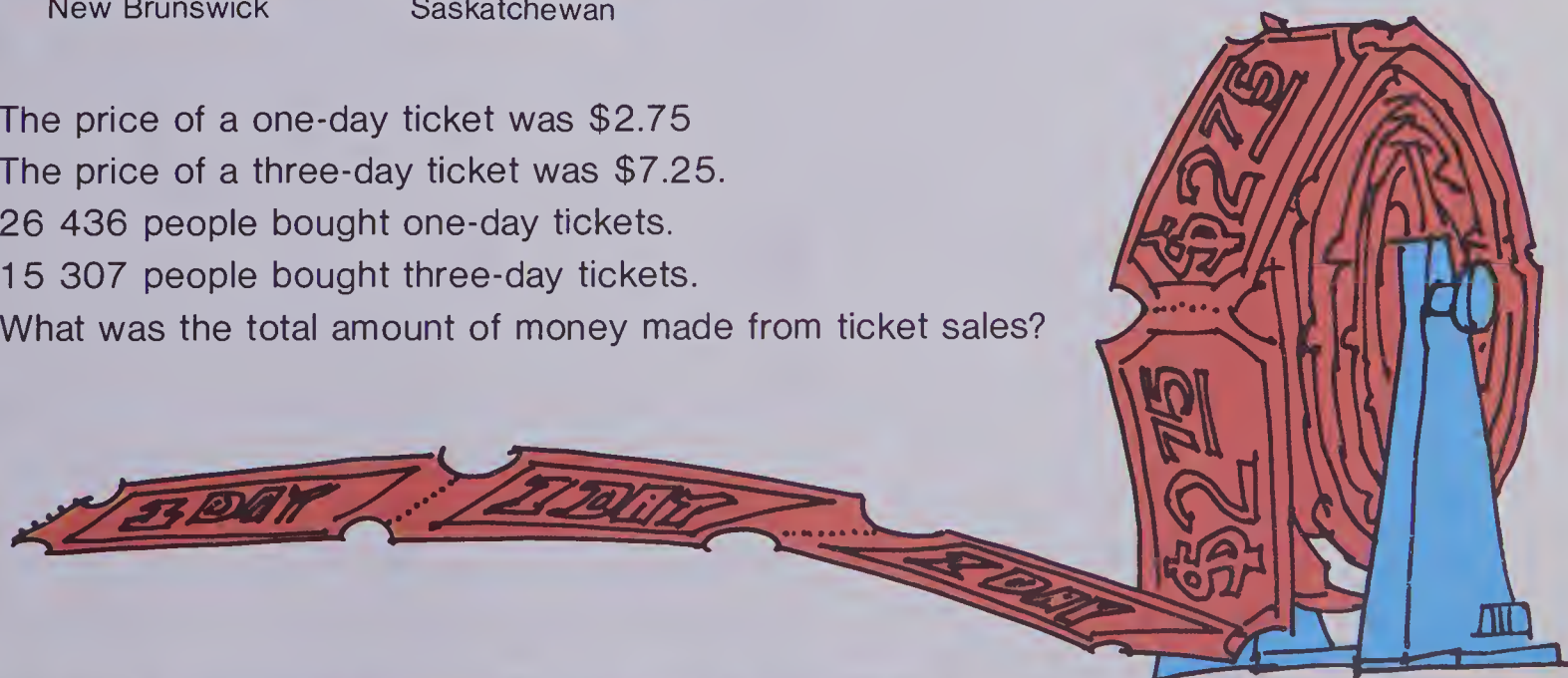
Province	Score			Total
Ontario	362	389	405	
B.C.	385	419	415	

In bowling, what was the total score of the contestant from Ontario?  
What was the total score of the contestant from B.C.?  
Who won and by how much?



What was the total score for the contestant from New Brunswick?  
What was the average score?  
What was the total score for the contestant from Saskatchewan?  
What was the average score?  
Who won?

8. The price of a one-day ticket was \$2.75  
The price of a three-day ticket was \$7.25.  
26 436 people bought one-day tickets.  
15 307 people bought three-day tickets.  
What was the total amount of money made from ticket sales?

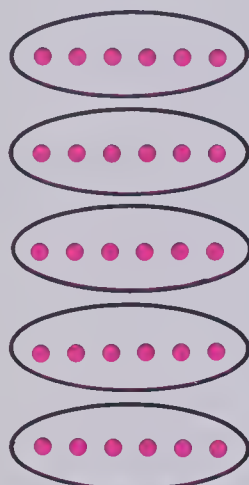




# Finding Products in a Different Way

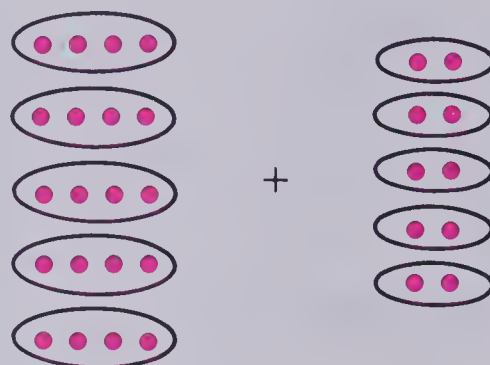
Here are two methods for finding a total number of marbles.

Method 1



$$5 \times 6 = 30$$

Method 2



$$\begin{aligned} (5 \times 4) + (5 \times 2) \\ = 20 + 10 \\ = 30 \end{aligned}$$



## Exercises

Use Method 2 to find each product.

$$\begin{aligned} 1. \quad 9 \times 11 &= 9 \times (10 + 1) \\ &= (9 \times 10) + (9 \times 1) \\ &= \blacksquare + \blacksquare \\ &= \blacksquare \end{aligned}$$

- (a)  $8 \times 13$
- (d)  $3 \times 15$
- (g)  $5 \times 12$
- (j)  $6 \times 11$

- (b)  $2 \times 14$
- (e)  $7 \times 12$
- (h)  $9 \times 17$
- (k)  $3 \times 18$

- (c)  $4 \times 17$
- (f)  $6 \times 18$
- (i)  $4 \times 16$
- (l)  $8 \times 15$

$$\begin{aligned} 2. \quad 5 \times 36.4 &= 5 \times (30 + 6.4) \\ &= (5 \times 30) + (5 \times 6.4) \\ &= \blacksquare + \blacksquare \\ &= \blacksquare \end{aligned}$$

- (a)  $8 \times 42$
- (d)  $6 \times 39$
- (g)  $3 \times 67.3$
- (j)  $7 \times 42.3$

- (b)  $7 \times 83$
- (e)  $4 \times 72$
- (h)  $9 \times 22.6$
- (k)  $3 \times 35.6$

- (c)  $4 \times 76$
- (f)  $8 \times 53$
- (i)  $4 \times 64.1$
- (l)  $6 \times 28.9$

$$\begin{aligned} 3. \quad 23 \times 74 &= 23 \times (70 + 4) \\ &= (23 \times \blacksquare) + (23 \times \blacksquare) \\ &= \blacksquare + \blacksquare \\ &= \blacksquare \end{aligned}$$

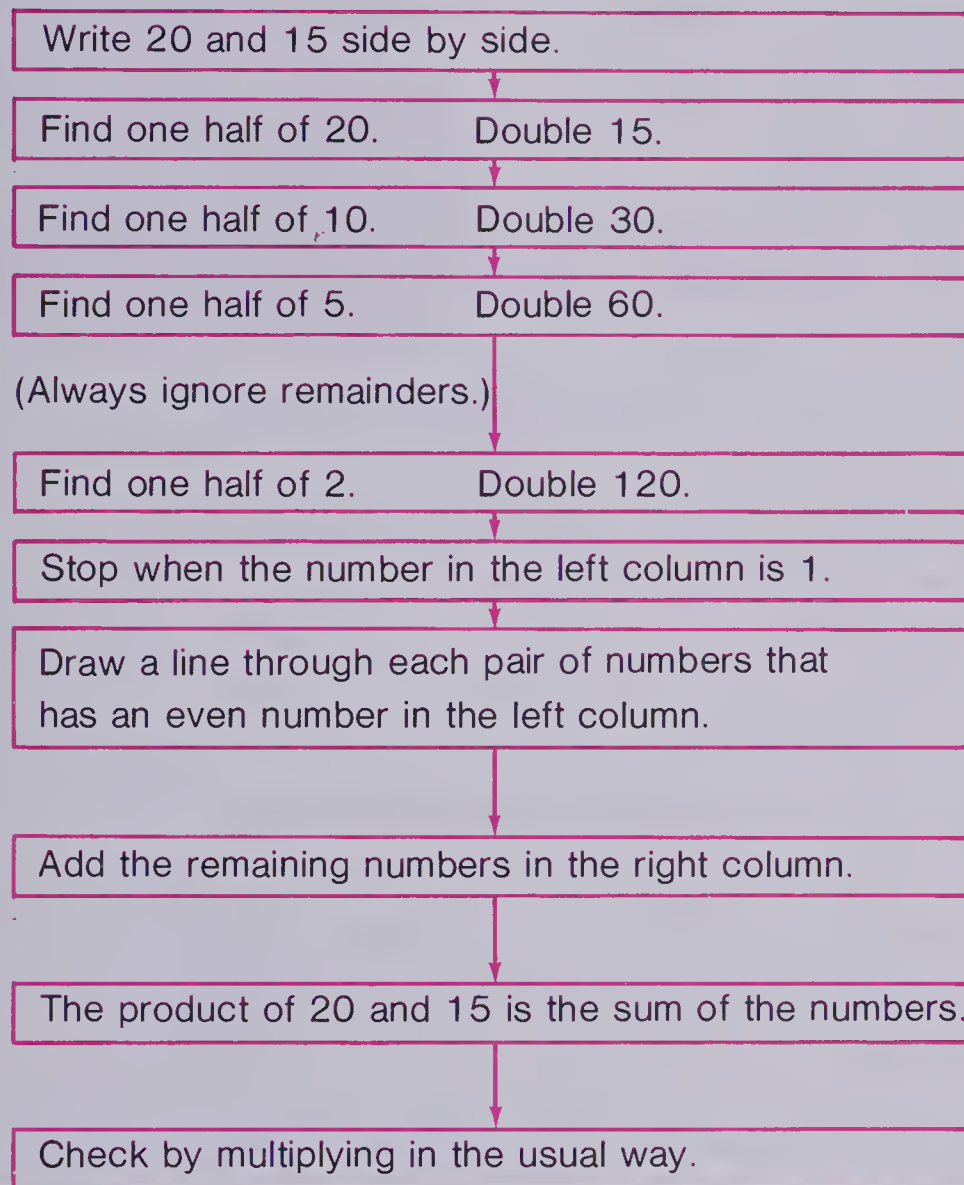
- (a)  $53 \times 42$
- (d)  $82 \times 49$
- (g)  $76 \times 45$

- (b)  $65 \times 27$
- (e)  $68 \times 91$
- (h)  $92 \times 81$

- (c)  $31 \times 85$
- (f)  $36 \times 36$
- (i)  $77 \times 19$

# Another Way to Multiply

Here is an interesting way to find the product of two numbers.  
To find the product of 20 and 15, follow these steps.



20	15
10	30
5	60
2	120
1	240

<del>20</del>	<del>15</del>
<del>10</del>	<del>30</del>
5	60
<del>2</del>	<del>120</del>
1	240

60
240
<hr/>
300
15
$\times 20$
<hr/>
300

## Exercises

Use this method to find the following products.

1.  $4 \times 26$

2.  $16 \times 45$

3.  $28 \times 56$

4.  $34 \times 385$

5.  $56 \times 144$

6.  $324 \times 479$

# Fore!

A box of golf balls costs \$6.95.  
The golf professional ordered 72 boxes.  
How much did he pay?  
Estimate by rounding before multiplying.

\$6.95 is rounded to      \$ 7.00

72 is rounded to      70

\$490.00

Actual

\$6.95

$\times 72$

1 390

48 650

\$500.40



Estimated answer is \$490.00.

Actual answer is \$500.40.

## Exercises

1. Round the money to the nearest dollar. Round each number to the nearest 10.  
Then multiply to find the estimated product.

(a) \$4.68	\$5.00	(b) \$9.02	(c) \$8.86	(d) \$6.07	(e) \$5.97
$\times 31$	$\times 30$	$\times 12$	$\times 49$	$\times 84$	$\times 68$
<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>

2. Round each number to the nearest hundred to find the estimated product.  
Then find the actual product.

(a) 793 $\times$ 84 891	(b) 389 $\times$ 75 612	(c) 304 $\times$ 38 121
-------------------------	-------------------------	-------------------------

3. 193 golfers paid an entry fee of \$15.75 each to compete in a golf tournament.  
Estimate the amount paid in entry fees.
4. The average cost of each prize for the tournament was \$17.45.  
Estimate the total cost of 48 prizes.
5. The average distance travelled by each competitor to the tournament was 48.7 km.  
Estimate the total distance travelled by the 193 competitors.
6. One spectator's ticket costs \$6.25. 14 913 tickets were sold.  
Estimate the total amount collected in ticket sales.



# The Volleyball Tournament

There are 20 players on a team.

There are 5 teams.

How many players altogether?

Multiply.  $20 \times 5 = N$

$$100 = N$$

There are 100 players altogether.



A number sentence with an equals sign is called an **equation**.

## Exercises

Write the value for each letter that makes the equation true.

1.  $4 \times 8 = N$   
 $? = N$

2.  $7 \times 9 = d$   
 $? = d$

3.  $10 \times 6 = n$   
 $? = n$

4.  $8 \times 7 = e$

5.  $8 \times 13 = B$

6.  $6 \times 15 = R$

7.  $3 \times 18 = N$

8.  $9 \times 16 = A$

9.  $7 \times 18 = B$

10.  $8 \times 14 = D$

11.  $5 \times 14 = E$

12.  $4 \times 46 = r$

13.  $6 \times 39 = n$

14.  $8 \times 64 = Z$

15.  $5 \times 348 = R$

16.  $7 \times 272 = b$

17.  $3 \times 460 = E$

18.  $8 \times 507 = N$

19.  $4 \times 3 = b \times 6$   
 $12 = b \times 6$   
 $? = b$

20.  $r \times 14 = 20 - 6$   
 $r \times 14 = 14$   
 $r = ?$

21.  $9 \times n = 63 + 9$   
 $9 \times n = 72$   
 $n = ?$

Copy and complete.

22.  $7 + 9 = R \times 4$

23.  $3 \times (4 + 1) = 2 + E$

24.  $(20 - 8) \times 2 = N$

25.  $5 + 6 + 9 = 4 \times B$

26.  $9 \times 9 = 100 - Z$

27.  $6 \times 5 = y \times 30$

28.  $48 = (5 \times 10) - f$

29.  $N + E + D = 3 \times 4$

30.  $6 \times 3 = R + 12$

31.  $42 - a = 9 \times 4$

32.  $8 \times 5 = 60 - S$

33.  $(4 \times 7) + B = (6 \times 6) + 2$

34.  $n + 5 + D = 5 \times 5$

35.  $(8 \times 7) + 4 = 72 - h$

36.  $E + (6 + 7) = 6 \times 4$

# Using Equations

Karl rode his bicycle to and from work each day.  
The round trip was 14.7 km.  
He worked 227 d in a year.  
How far did he ride in a year?

Write an equation:  $14.7 \times 227 = n$

$\swarrow$                        $\downarrow$                        $\searrow$   
kilometres      number      stands for total  
per day      of      number of  
                 days      kilometres

Solve the equation:  $14.7 \times 227 = 3336.9$   
Write a statement: Karl rode 3336.9 km in a year.



## Exercises

Write and solve an equation for each problem.

1. A book has 211 pages.  
There are 12 copies of the book.  
How many pages altogether?
2. Mario has \$275.  
Benny has twice as much as Mario.  
How much does Benny have?
3. Wong ran 1500 m.  
Lee bicycled 5 times that distance.  
How far did Lee bicycle?
4. Tom saved \$5.75 a week for 7 weeks.  
He spent \$20.00 of what he had saved  
for a birthday gift.  
How much did he have left?
5. Linda raised 23 sheep.  
She sold each one for \$64.50.  
How much did she receive?
- ★ 6. Lois had \$35.00.  
She paid bills of \$17.35 and \$12.08.  
How much did she have left?

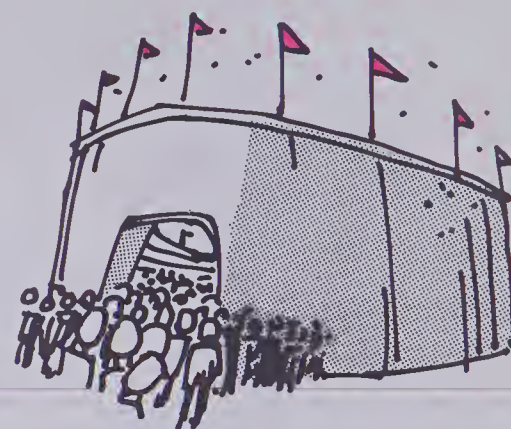
# Play Ball

The sports stadium has 3255 seats.  
For 157 baseball games the stadium was filled.  
How many people attended these games?

Write an equation:  $3255 \times 157 = N$   
 $511\ 035 = N$

511 035 people attended the games.

$$\begin{array}{r} 3255 \\ \times 157 \\ \hline 22\ 785 \\ 162\ 750 \\ 325\ 500 \\ \hline 511\ 035 \end{array}$$



## Exercises

1. (a)  $\begin{array}{r} 3516 \\ \times 231 \\ \hline \end{array}$  (b)  $\begin{array}{r} 6857 \\ \times 473 \\ \hline \end{array}$  (c)  $\begin{array}{r} 7924 \\ \times 649 \\ \hline \end{array}$  (d)  $\begin{array}{r} 8923 \\ \times 917 \\ \hline \end{array}$  (e)  $\begin{array}{r} 5374 \\ \times 753 \\ \hline \end{array}$

2. (a)  $476 \times 68\ 527$  (b)  $339 \times 84\ 359$  (c)  $763 \times 38\ 027$

3. (a)  $\begin{array}{r} 3856 \\ \times 304 \\ \hline \end{array}$  (b)  $\begin{array}{r} 4823 \\ \times 408 \\ \hline \end{array}$  (c)  $\begin{array}{r} 9765 \\ \times 307 \\ \hline \end{array}$  (d)  $\begin{array}{r} 8237 \\ \times 4268 \\ \hline \end{array}$  (e)  $\begin{array}{r} 9876 \\ \times 4703 \\ \hline \end{array}$

4. (a)  $\begin{array}{r} 8503 \\ \times 9830 \\ \hline \end{array}$  (b)  $\begin{array}{r} 8323 \\ \times 5006 \\ \hline \end{array}$  (c)  $\begin{array}{r} 7682 \\ \times 6003 \\ \hline \end{array}$  (d)  $\begin{array}{r} 6002 \\ \times 4007 \\ \hline \end{array}$  (e)  $\begin{array}{r} 3487 \\ \times 1002 \\ \hline \end{array}$

5. (a)  $7682 \times 64\ 358$  (b)  $4765 \times 92\ 634$  (c)  $3076 \times 76\ 842$

6. Multiply to find these peculiar products.

(a)  $\begin{array}{r} 12\ 345\ 679 \\ \times \quad \quad 18 \\ \hline \end{array}$

(b)  $\begin{array}{r} 12\ 345\ 679 \\ \times \quad \quad 27 \\ \hline \end{array}$

(c)  $\begin{array}{r} 12\ 345\ 679 \\ \times \quad \quad 108 \\ \hline \end{array}$

- ★ 7. 28 209 people attended each of the 102 baseball games at a baseball stadium.  
Also, 34 008 people attended 28 of the baseball games.  
How many people attended in all?



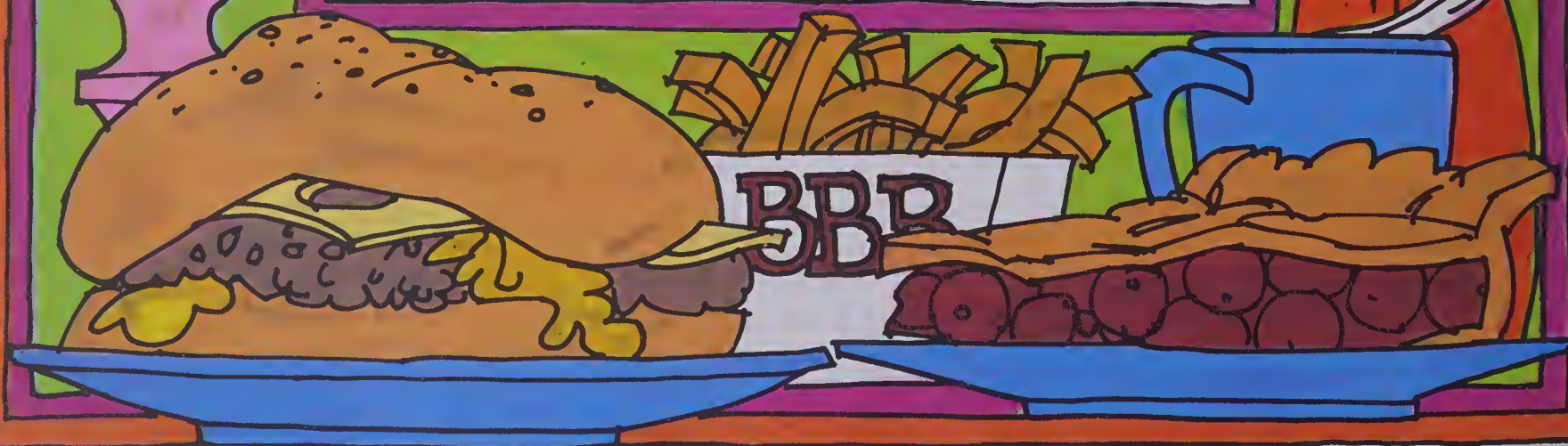
# Buffy's Beautiful Burgers

## Menu

Beautiful Burger	\$1.25
with cheese	\$1.45
Big Beautiful Burger	\$1.60
with cheese	\$1.80
Jumbo Beautiful Burger	\$2.05
with cheese	\$2.25

Tomato \$0.10 extra

French Fries	small \$0.65	large \$0.95
Onion Rings	small \$0.65	large \$0.95
Pie (cherry, apple)		\$0.75
Soft Drinks (cola, orange)		
small \$0.40	medium \$0.60	large \$0.75
Coffee and Tea		\$0.75
Milk	small \$0.45	large \$0.65
Fizzy Special		\$1.05



# The Waitress

Marie is a waitress at Buffy's Beautiful Burgers.

1. At table number five, 3 men each ordered:

- 1 big beautiful burger
- 1 small French fries
- 1 medium cola

What was the total cost of the three orders?

2. On Saturday afternoon, Bob ordered:

- 1 jumbo beautiful burger with cheese and tomato
- 1 large onion rings
- 1 piece of cherry pie
- 1 coffee

Elaine had:

- 1 big beautiful burger
- 1 small French fries
- 1 large milk

- (a) How much did each order cost?
- (b) How much more did Bob's order cost than Elaine's?

3. The Paterson Family ordered:

- 6 jumbo beautiful burgers
- 6 large French fries
- 6 fizzy specials

- (a) What was the total cost?
- (b) How much change did Mrs. Paterson get from \$25?

4. (a) If you were at Buffy's Beautiful Burgers, what would your order be?  
(b) How much would it cost?





# Chapter Test

1. (a)  $76 \times 63$  (b)  $63 \times 308$  (c)  $634 \times 409$  (d)  $5831 \times 6350$
2. (a)  $100 \times 38$  (b)  $10 \times 724$  (c)  $1000 \times 542$  (d)  $100 \times 370$
3. (a) 
$$\begin{array}{r} 85.9 \\ \times 6 \\ \hline \end{array}$$
 (b) 
$$\begin{array}{r} 23.64 \\ \times 3 \\ \hline \end{array}$$
 (c) 
$$\begin{array}{r} 483 \\ \times 0.6 \\ \hline \end{array}$$
 (d) 
$$\begin{array}{r} 2039 \\ \times 0.4 \\ \hline \end{array}$$
4. (a)  $0.01 \times 8$  (b)  $0.001 \times 374$  (c)  $0.001 \times 591$  (d)  $0.01 \times 3852$
5. (a)  $3.7 \times 87$  (b)  $9.1 \times 4835$  (c)  $5.38 \times 290$  (d)  $0.05 \times 3529$
6. (a) 
$$\begin{array}{r} 0.9 \\ \times 0.4 \\ \hline \end{array}$$
 (b) 
$$\begin{array}{r} 3.7 \\ \times 0.6 \\ \hline \end{array}$$
 (c) 
$$\begin{array}{r} 8.3 \\ \times 0.92 \\ \hline \end{array}$$
 (d) 
$$\begin{array}{r} 0.159 \\ \times 3.7 \\ \hline \end{array}$$
7. (a)  $13.5 \times \$4.67$  (b)  $27.6 \times \$9.35$  (c)  $5.02 \times \$50.07$  (d)  $0.7 \times \$853.45$
8. Copy and complete.  
 (a)  $29 \times 36 = \blacksquare \times 29$  (b)  $3 \times (15 + 4) = 3 \times 15 + \blacksquare \times \blacksquare$
9. Round each number to estimate the answer. Show your work.  
 Calculate the actual answer.  
 (a) There are 72 pencils in each box. There are 450 boxes.  
 How many pencils altogether?  
 (b) Each crate of oranges has a mass of 28.75 kg.  
 What is the total mass of 675 crates?
10. Write an equation for each problem and solve.  
 (a) At a record sale, 52 albums were sold at \$4.99 each.  
 How much money was received?  
 (b) Janice runs 0.2 km in 1 min.  
 How far will she run in 16.3 min?



# Cumulative Review

1. Add.

$$\begin{array}{r} (a) \quad 1882 \\ 903 \\ 487 \\ + 2170 \\ \hline \end{array}$$

$$\begin{array}{r} (b) \quad \$ 736.75 \\ 127.02 \\ 35.19 \\ + 620.71 \\ \hline \end{array}$$

$$\begin{array}{r} (c) \quad 0.765 \\ 1.276 \\ 5.620 \\ + 0.761 \\ \hline \end{array}$$

$$\begin{array}{r} (d) \quad \$ 376.52 \\ 92.01 \\ 483.78 \\ + 20.65 \\ \hline \end{array}$$

2. Subtract.

$$\begin{array}{r} (a) \quad 48\,276 \\ - 19\,028 \\ \hline \end{array}$$

$$\begin{array}{r} (b) \quad \$6352.17 \\ - 981.08 \\ \hline \end{array}$$

$$\begin{array}{r} (c) \quad 80\,000 \\ - 14\,635 \\ \hline \end{array}$$

$$\begin{array}{r} (d) \quad 0.475 \\ - 0.297 \\ \hline \end{array}$$

3. Write in words.

(a) 13 800 573

(b) 67 000 000 000

(c) 6 476 000 000

4. Write in decimal form.

(a)  $12 \frac{7}{10}$

(b)  $409 \frac{27}{1000}$

(c)  $561 \frac{33}{100}$

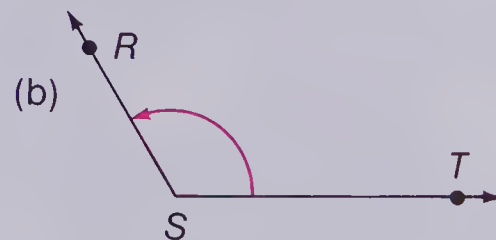
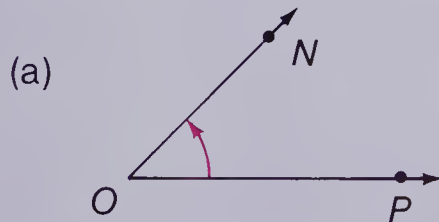
(d)  $800 \frac{9}{1000}$

5. Draw an acute angle and label it  $\angle EFG$ .

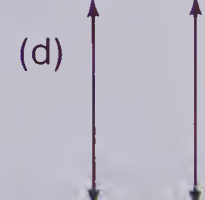
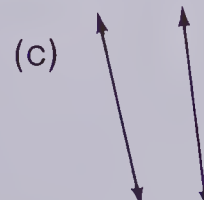
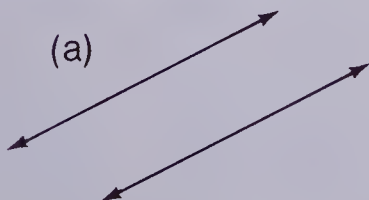
6. Draw a straight angle and label it  $\angle PQR$ .

7. Use your protractor.

What is the measure of each angle?



8. Identify each pair of lines as parallel or not parallel.



# Chapter 4

## Division and Measurement

Division into Decimals

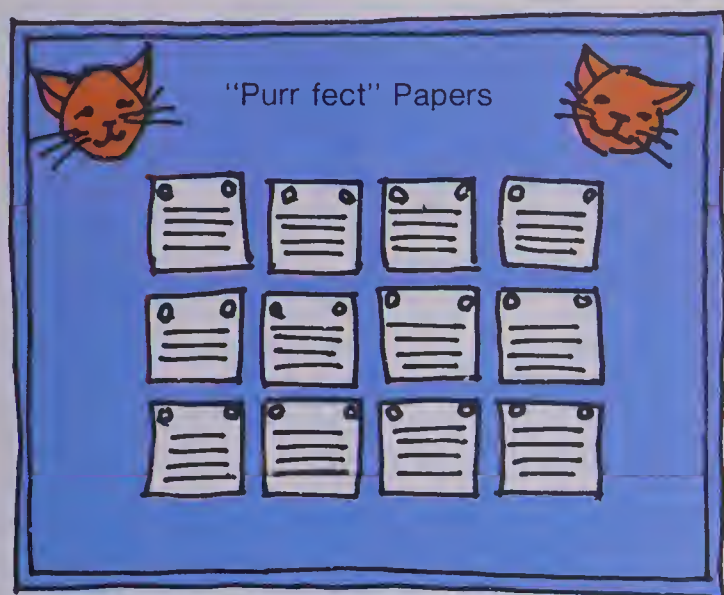
Perimeter and Circumference

Area and Volume

Capacity



# Bulletin Boards



On the Grade 6 math bulletin board there were 12 “Purr fect” papers with 3 rows and 4 columns.

Dividend  
Divisor  
Quotient

$$12 \div 3 = 4$$

means there are  
4 groups of 3  
in 12.

Dividend  
Divisor  
Quotient

$$12 \div 4 = 3$$

means there are  
3 groups of 4  
in 12.

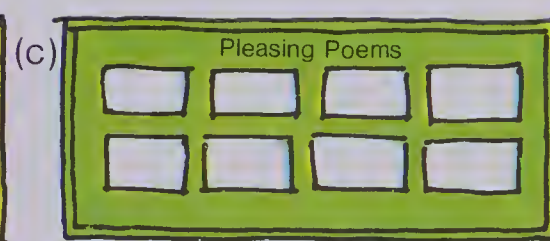
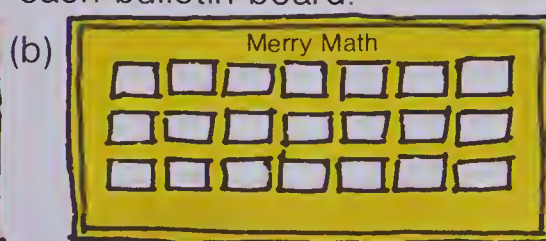
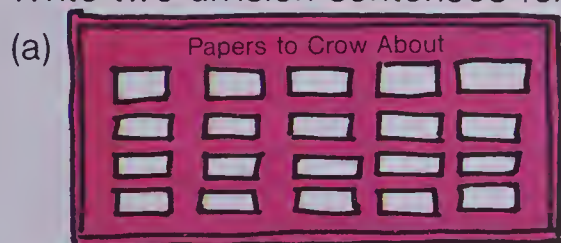
We can show division in other ways.

$$\begin{array}{r} 4 \text{ --- Quotient} \\ \text{Divisor --- } 3 \overline{)12} \text{ --- Dividend} \end{array}$$

$$\begin{array}{r} \text{Dividend --- } 12 \\ \text{---} = 3 \text{ --- Quotient} \\ \text{Divisor --- } 4 \end{array}$$

## Exercises

1. Write two division sentences for each bulletin board.



2. Write each question in words, and then solve.

(a)  $3 \overline{)15}$  How many groups  
of 3 in 15?  
There are 5.

(b)  $6 \overline{)24}$   
(e)  $32 \div 4$   
(h)  $\frac{30}{6}$

(c)  $7 \overline{)49}$   
(f)  $48 \div 6$   
(i)  $\frac{20}{4}$

(d)  $5 \overline{)35}$   
(g)  $72 \div 9$   
(j)  $\frac{28}{7}$

3. Find the quotient.

(a) $18 \div 3$	(b) $64 \div 8$	(c) $42 \div 7$	(d) $9 \div 9$	(e) $14 \div 2$
(f) $8 \overline{)56}$	(g) $9 \overline{)63}$	(h) $6 \overline{)54}$	(i) $9 \overline{)81}$	(j) $5 \overline{)10}$
(k) $\frac{6}{2}$	(l) $\frac{16}{8}$	(m) $\frac{24}{4}$	(n) $\frac{63}{7}$	(o) $\frac{48}{8}$



# Tune Up

Divide.

1.  $6 \overline{)36}$

2.  $8 \overline{)48}$

3.  $7 \overline{)56}$

4.  $9 \overline{)81}$

5.  $4 \overline{)16}$

6.  $30 \div 5$

7.  $42 \div 6$

8.  $18 \div 2$

9.  $12 \div 3$

10.  $72 \div 8$

11.  $\frac{24}{8}$

12.  $\frac{15}{5}$

13.  $\frac{49}{7}$

14.  $\frac{28}{4}$

15.  $\frac{54}{6}$

16.  $9 \overline{)72}$

17.  $7 \overline{)35}$

18.  $5 \overline{)40}$

19.  $6 \overline{)48}$

20.  $3 \overline{)18}$

21.  $42 \div 6$

22.  $16 \div 2$

23.  $20 \div 4$

24.  $24 \div 6$

25.  $27 \div 9$

26.  $6 \overline{)39}$

27.  $9 \overline{)85}$

28.  $8 \overline{)49}$

29.  $7 \overline{)53}$

30.  $8 \overline{)27}$

31.  $\frac{355}{5}$

32.  $\frac{427}{7}$

33.  $\frac{549}{9}$

34.  $\frac{606}{3}$

35.  $\frac{648}{8}$

36.  $344 \div 4$

37.  $460 \div 5$

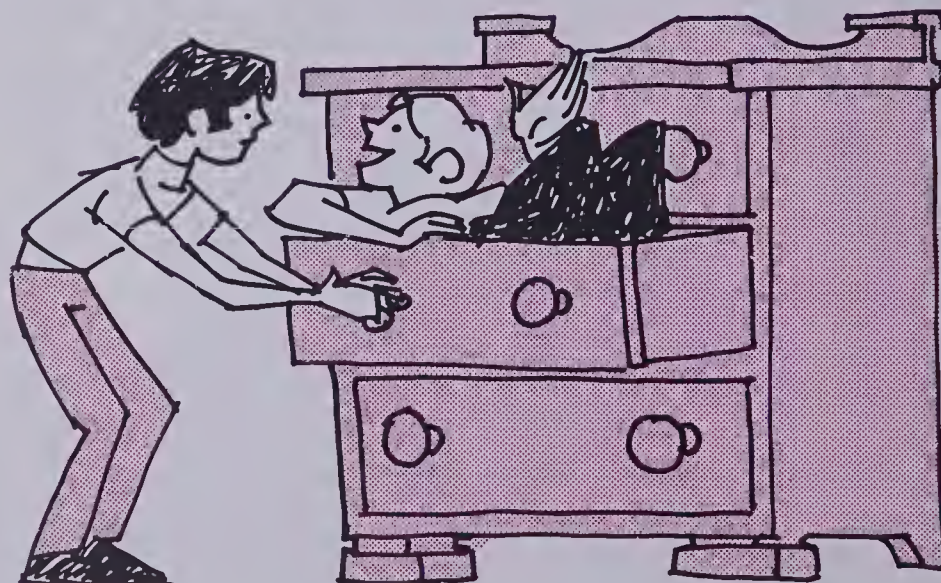
38.  $196 \div 7$

39.  $804 \div 2$

40.  $937 \div 9$

Are you in the  
"Top Drawer"?

Top Drawer	40-35
Middle Drawer	34-25
Bottom Drawer	24-20



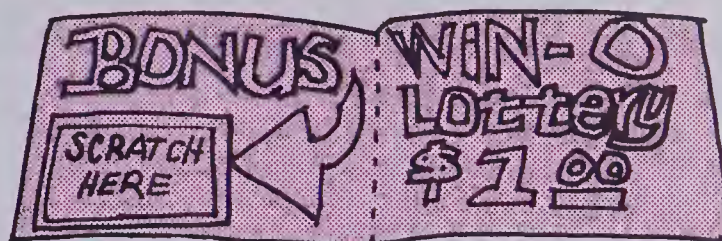
# Lottery Tickets



10 people shared a \$100 prize equally. How much did each receive?

$$\$100 \div 10 = \$10$$

Each received \$10.



100 people shared a \$2500 prize equally. How much did each receive?

$$\$2500 \div 100 = \$25$$

Each received \$25.



1000 people shared a \$750 000 prize equally. How much did each receive?

$$\$750\,000 \div 1000 = \$750$$

Each received \$750.

Study the examples carefully. What rule helps you to divide by 10, 100, and 1000?

## Exercises

1. Divide.

(a)  $70 \div 10$

(b)  $90 \div 10$

(c)  $660 \div 10$

(d)  $760 \div 10$

(e)  $\$8000 \div 10$

(f)  $\$3770 \div 10$

(g)  $\$85\,630 \div 10$

(h)  $\$52\,640 \div 10$

2. Divide.

(a)  $600 \div 100$

(b)  $900 \div 100$

(c)  $4700 \div 100$

(d)  $8300 \div 100$

(e)  $\$64\,800 \div 100$

(f)  $\$75\,500 \div 100$

(g)  $\$29\,600 \div 100$

(h)  $\$673\,000 \div 100$

3. Find the quotient.

(a)  $4000 \div 1000$

(b)  $6000 \div 1000$

(c)  $78\,000 \div 1000$

(d)  $92\,000 \div 1000$

(e)  $\$62\,000 \div 100$

(f)  $\$769\,000 \div 1000$

(g)  $\$685\,000 \div 1000$

(h)  $376\,111 \div 1000$

★ 4. (a)  $7\,000\,000 \div 10\,000$

(b)  $700\,000\,000 \div 100\,000$

(c)  $7\,000\,000 \div 1\,000\,000$



# Baking

Mary baked 145 cookies. She wanted to divide them evenly among 6 friends.

How many cookies did she give each friend?

How many did she have left over?

Division Steps:

1. Divide.

Think: How many 6's in 14?

There are 2.

Write the 2 above the 4.

2. Multiply.

Think: 2 times 6 is 12.

Write the 12 under the 14.

3. Subtract.

Think: 14 minus 12 is 2.

Write the 2.

4. Check.

Think: Is 2 less than the divisor 6? Yes.

5. Next number.

Write the next number, 5, beside the 2.

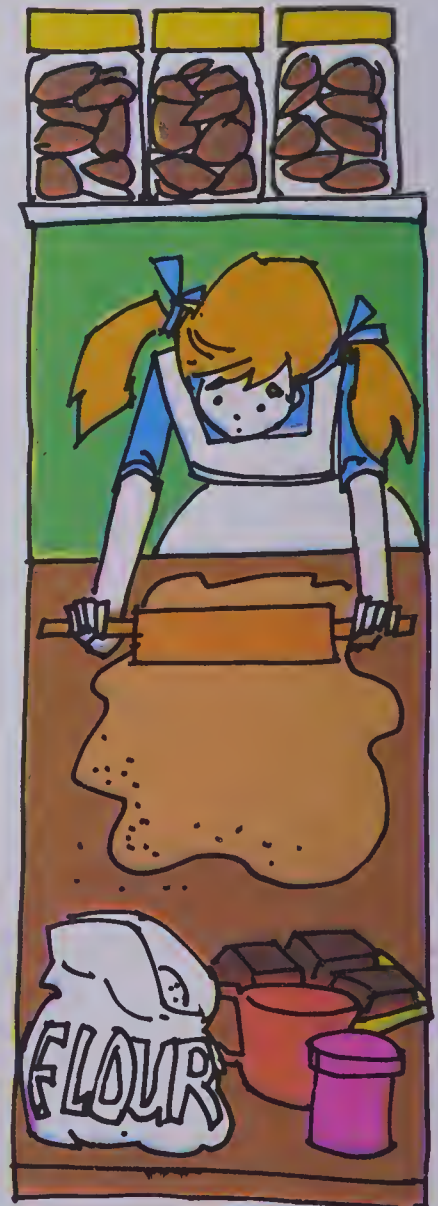
$$\begin{array}{r} 2 \\ 6 \overline{) 145} \end{array}$$

$$\begin{array}{r} 2 \\ 6 \overline{) 145} \\ \underline{12} \end{array}$$

$$\begin{array}{r} 2 \\ 6 \overline{) 145} \\ \underline{-12} \\ 2 \end{array}$$

$$\begin{array}{r} 2 \\ 6 \overline{) 145} \\ \underline{-12} \\ 25 \end{array}$$

$$\begin{array}{r} 24 \text{ R } 1 \\ 6 \overline{) 145} \\ \underline{-12} \\ 25 \\ \underline{24} \\ 1 \end{array}$$



Begin again. Work through Steps 1 to 4.

Mary gave 24 cookies to each friend. She had one cookie left over, and she ate it.



# Exercises

1. Copy and complete.

(a) 
$$\begin{array}{r} 29 \text{ R } 3 \\ 7 \overline{)206} \\ \underline{1\phantom{00}} \\ 66 \\ \underline{\phantom{00}22} \\ 3 \end{array}$$

(b) 
$$\begin{array}{r} 93\blacksquare \\ 5 \overline{)4675} \\ \underline{\phantom{00}22} \\ 17 \\ \underline{\phantom{00}22} \\ 25 \\ \underline{\phantom{00}22} \\ \phantom{00}3 \end{array}$$

(c) 
$$\begin{array}{r} 1\blacksquare\blacksquare \text{ R } 5 \\ 8 \overline{)941} \\ \underline{\phantom{00}8} \\ \phantom{00}\blacksquare\blacksquare \\ \underline{\phantom{00}8} \\ \phantom{00}61 \\ \underline{\phantom{00}56} \\ \phantom{00}5 \end{array}$$

2. (a)  $7 \overline{)896}$

(b)  $4 \overline{)637}$

(c)  $6 \overline{)788}$

(d)  $5 \overline{)845}$

(e)  $3 \overline{)576}$

(f)  $6 \overline{)942}$

(g)  $2 \overline{)371}$

(h)  $8 \overline{)947}$

3. (a)  $6 \overline{)1374}$

(b)  $8 \overline{)3896}$

(c)  $3 \overline{)2361}$

(d)  $7 \overline{)5467}$

(e)  $7 \overline{)5293}$

(f)  $5 \overline{)3758}$

(g)  $4 \overline{)3827}$

(h)  $9 \overline{)7033}$

4. (a)  $5 \overline{)37\,476}$

(b)  $9 \overline{)19\,589}$

(c)  $6 \overline{)47\,264}$

(d)  $4 \overline{)23\,760}$

(e)  $8 \overline{)35\,987}$

(f)  $7 \overline{)52\,904}$

(g)  $3 \overline{)47\,686}$

(h)  $5 \overline{)83\,245}$

5. Each box holds 6 candles. There are 3684 candles.  
How many boxes will be needed to pack the candles?



★ 6. Five boys delivered 6340 handbills.  
How many handbills did each boy deliver if each delivered the same number?

# Parking Lots

Pete's Parking has room for 850 cars. There are 25 spaces for cars in each row. How many rows are there in Pete's Parking?

Divide.

$$\begin{array}{r} 34 \\ 25 \overline{) 850} \\ \underline{75} \phantom{0} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

Check by multiplying:

$$\begin{array}{r} 34 \\ \times 25 \\ \hline 170 \\ 680 \\ \hline 850 \end{array}$$

There are 34 rows in Pete's Parking.



## Exercises

1. Divide. Check by multiplying.

$$\begin{array}{r} 21 \\ 30 \overline{) 630} \\ \underline{60} \phantom{0} \\ 30 \\ \underline{30} \\ 0 \end{array}$$

(b)  $70 \overline{) 910}$

(c)  $40 \overline{) 520}$

(d)  $90 \overline{) 720}$

(e)  $50 \overline{) 650}$

(f)  $70 \overline{) 560}$

(g)  $20 \overline{) 240}$

(h)  $60 \overline{) 660}$

2. Divide.

$$\begin{array}{r} 6 \\ 47 \overline{) 282} \\ \underline{282} \\ 0 \end{array}$$

(b)  $58 \overline{) 290}$

(c)  $82 \overline{) 328}$

(d)  $54 \overline{) 108}$

(e)  $29 \overline{) 232}$

(f)  $71 \overline{) 426}$

(g)  $56 \overline{) 224}$

(h)  $62 \overline{) 248}$

3. At Civic Parking, a row holds 20 cars.

How many rows would be needed to park 360 cars?

4. Centre City Parking Lot holds 576 cars.

There are 18 rows.

How many spaces are there in each row?



5. Find the quotient.

$$\begin{array}{r} 36 \\ 43 \overline{) 1548} \\ \underline{129} \phantom{0} \\ 258 \\ \underline{258} \\ 0 \end{array}$$

(b)  $75 \overline{) 1875}$

(c)  $33 \overline{) 2112}$

(d)  $62 \overline{) 3968}$

(e)  $27 \overline{) 1431}$

(f)  $64 \overline{) 3968}$

(g)  $36 \overline{) 1728}$

(h)  $93 \overline{) 7068}$

(i)  $49 \overline{) 2842}$

(j)  $28 \overline{) 1204}$

6. Divide.

$$\begin{array}{r} 302 \\ 27 \overline{) 8154} \\ \underline{81} \phantom{00} \\ 05 \phantom{00} \\ \underline{0} \phantom{00} \\ 5 \phantom{00} \\ \underline{54} \phantom{00} \\ 0 \end{array}$$

(b)  $32 \overline{) 6592}$

(c)  $44 \overline{) 4620}$

(d)  $56 \overline{) 5768}$

(e)  $34 \overline{) 7106}$

(f)  $29 \overline{) 8903}$

(g)  $31 \overline{) 9393}$

7. Find the quotient.

$$\begin{array}{r} 194 \\ 56 \overline{) 10864} \\ \underline{56} \phantom{00} \\ 526 \phantom{00} \\ \underline{504} \phantom{00} \\ 22 \phantom{00} \\ \underline{224} \phantom{00} \\ 0 \end{array}$$

(b)  $64 \overline{) 22784}$

(c)  $47 \overline{) 13489}$

(d)  $42 \overline{) 21966}$

(e)  $50 \overline{) 13800}$

8. The City Music Centre parking lot was full every evening for 35 d straight. During this time it held a total of 14 420 cars. How many cars each evening?



# Rolling Coins

Pat saved 736 pennies. He rolled them in brown paper rolls with 50 pennies in each roll.  
How many rolls did he have?

How many pennies did he have left over?

Divide.  $50 \overline{)736}$

$$\begin{array}{r}
 14 \text{ R } 36 \\
 50 \overline{)736} \\
 \underline{50} \phantom{00} \\
 236 \\
 \underline{200} \\
 36
 \end{array}$$

Check by multiplying:

$$\begin{array}{r}
 14 \\
 \times 50 \\
 \hline
 700 \\
 + 36 \text{ (add the remainder)} \\
 \hline
 736
 \end{array}$$



He had 14 rolls and 36 pennies left over.

## Exercises

1. Divide.

(a)  $40 \overline{)207}$

$$\begin{array}{r}
 5 \text{ R } 7 \\
 40 \overline{)207} \\
 \underline{200} \\
 7
 \end{array}$$

(b)  $70 \overline{)569}$

(c)  $30 \overline{)246}$

(d)  $60 \overline{)542}$

(e)  $20 \overline{)165}$

(f)  $90 \overline{)724}$

(g)  $80 \overline{)481}$

2. Find the quotient and the remainder.

(a)  $73 \overline{)456}$

$$\begin{array}{r}
 6 \text{ R } 18 \\
 73 \overline{)456} \\
 \underline{438} \\
 18
 \end{array}$$

(b)  $64 \overline{)273}$

(c)  $52 \overline{)475}$

(d)  $94 \overline{)599}$

(e)  $81 \overline{)408}$

(f)  $72 \overline{)219}$

(g)  $56 \overline{)397}$

3. Mrs. Blackwood has 185 coins in her collection.

She uses 15 coins to fill a page in her album.

How many full pages?

How many coins left over?



4. Find each quotient and remainder.

(a)  $93 \overline{)5591}$

(b)  $42 \overline{)5782}$

(c)  $86 \overline{)6331}$

(d)  $99 \overline{)7185}$

(e)  $83 \overline{)5939}$

(f)  $39 \overline{)1434}$

(g)  $31 \overline{)6549}$

(h)  $22 \overline{)4895}$

5. Divide.

308 R 10

(a) 
$$\begin{array}{r} 42 \overline{)12\,946} \\ \underline{12\,6} \phantom{00} \\ 34 \phantom{00} \\ \underline{00} \phantom{00} \\ 346 \\ \underline{\phantom{00}000} \\ \phantom{00}46 \end{array}$$

(b)  $93 \overline{)46\,769}$

(c)  $34 \overline{)35\,351}$

(d)  $78 \overline{)31\,649}$

(e)  $45 \overline{)91\,376}$

(f)  $62 \overline{)89\,321}$

(g)  $81 \overline{)80\,117}$

(h)  $48 \overline{)50\,800}$

(i)  $56 \overline{)90\,000}$

6. Find each quotient and remainder.

996 R 10

(a) 
$$\begin{array}{r} 54 \overline{)53\,794} \\ \underline{48\,6} \phantom{00} \\ 5\,19 \phantom{00} \\ \underline{4\,86} \phantom{00} \\ \phantom{00}3\,34 \\ \underline{\phantom{00}3\,24} \\ \phantom{000}10 \end{array}$$

(b)  $23 \overline{)20\,976}$

(c)  $65 \overline{)64\,682}$

(d)  $33 \overline{)32\,487}$

(e)  $95 \overline{)93\,658}$

(f)  $84 \overline{)72\,600}$

(g)  $42 \overline{)88\,000}$

(h)  $19 \overline{)86\,008}$

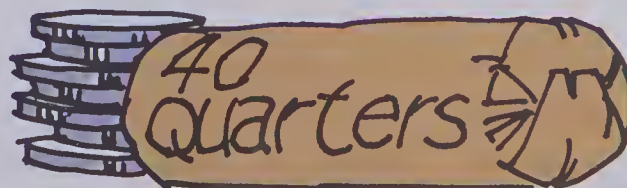
(i)  $77 \overline{)10\,007}$

7. At the bank, Mrs. Wilson has 865 quarters to roll.

She packs 40 coins to a roll.

How many full rolls is this?

How many quarters will be left over?



# Skipping Ropes

The total length of 5 skipping ropes is 22.5 m.  
What is the length of 1 skipping rope?

Divide. 
$$\begin{array}{r} 4.5 \\ 5 \overline{) 22.5} \\ \underline{20} \phantom{0} \\ 25 \phantom{0} \\ \underline{25} \phantom{0} \\ 0 \end{array}$$

Check by multiplying:

$$\begin{array}{r} 4.5 \\ \times 5 \\ \hline 22.5 \end{array}$$



The length of one skipping rope is 4.5 m.

## Exercises

1. Find the quotient.

(a)

$$3 \overline{) 70.8}$$

(b)

$$4 \overline{) 67.2}$$

(c)

$$7 \overline{) 30.1}$$

(d)

$$5 \overline{) 48.0}$$

(e)

$$9 \overline{) 78.3}$$

(f)

$$4 \overline{) 19.2}$$

(g)

$$8 \overline{) 47.2}$$

(h)

$$3 \overline{) 23.1}$$

2. Divide.

(a)

$$23 \overline{) 13.8}$$

(b)

$$62 \overline{) 18.6}$$

(c)

$$14 \overline{) 50.4}$$

(d)

$$28 \overline{) 95.2}$$

3. Find the quotient.

(a)

$$25.2 \div 28$$

(b)

$$79.2 \div 36$$

(c)

$$40.5 \div 81$$

(d)

$$98.4 \div 41$$

4. The total length of 8 skipping ropes is 16.8 m.

What is the length of 1 skipping rope?

5. For a class party, 33 students want to make

a paper chain. They want the chain to be 75.9 m long.

How much should each person make?

- ★ 6. Patricia, Jane, and Sonia collected equal amounts of apples. Altogether they gathered 98.4 kg. How many kilograms of apples did each of them pick?





# “Rainy Recess” Games

Mr. Richards’ Grade 6 class at Young St. School collected \$63.84 to buy “Rainy Recess” games.

They bought 8 different games. Each one was the same price.

What was the price of each game?

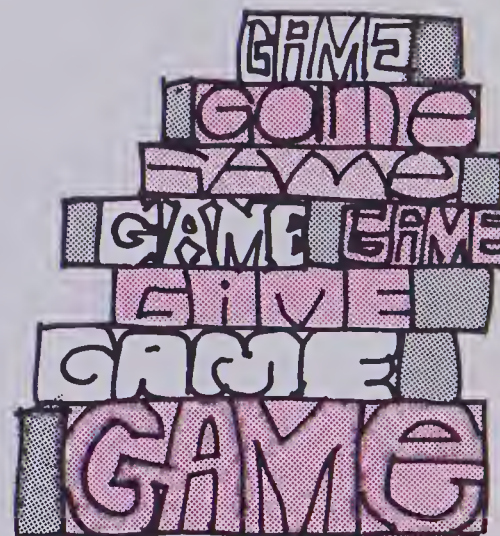
Divide.

$$\begin{array}{r} \$7.98 \\ 8 \overline{) \$63.84} \\ \underline{56} \phantom{00} \\ 78 \phantom{00} \\ \underline{72} \phantom{00} \\ 64 \phantom{00} \\ \underline{64} \phantom{00} \\ 0 \end{array}$$

Check by multiplying:

$$\begin{array}{r} \$7.98 \\ \times 8 \\ \hline \$63.84 \end{array}$$

The price of each game was \$7.98.



## Exercises

1. Divide.

- |                              |                              |                              |                              |
|------------------------------|------------------------------|------------------------------|------------------------------|
| (a) $9 \overline{) \$58.32}$ | (b) $5 \overline{) \$32.85}$ | (c) $4 \overline{) \$21.36}$ | (d) $8 \overline{) \$55.36}$ |
| (e) $\$69.12 \div 8$         | (f) $\$27.84 \div 3$         | (g) $\$11.55 \div 7$         | (h) $\$49.15 \div 5$         |

2. Find the quotient.

- |                             |                             |                             |                             |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| (a) $9 \overline{) 208.53}$ | (b) $5 \overline{) 119.45}$ | (c) $8 \overline{) 600.32}$ | (d) $6 \overline{) 147.9}$  |
| (e) $4 \overline{) 251.24}$ | (f) $7 \overline{) 597.52}$ | (g) $8 \overline{) 451.92}$ | (h) $6 \overline{) 411.96}$ |

3. Divide.

- |                                |                                |                                |                                |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| (a) $27 \overline{) 64.53}$    | (b) $35 \overline{) 222.25}$   | (c) $62 \overline{) 517.08}$   | (d) $45 \overline{) 373.95}$   |
| (e) $89 \overline{) \$529.55}$ | (f) $74 \overline{) \$319.68}$ | (g) $87 \overline{) \$749.07}$ | (h) $26 \overline{) \$203.58}$ |

4. Grandma Murphy bought 6 games for her grandchildren.

Each game was the same price. She spent \$23.94 altogether.

What was the price of one?

5. Dana, George, and Pierre saved \$61.50 to buy a TV computer game.

They each saved the same amount.

How much did each save?

# Units of Length

$$10 \text{ mm} = 1 \text{ cm}$$

$$100 \text{ cm} = 1 \text{ m}$$

$$100 \text{ m} = 1 \text{ hm}$$

$$1000 \text{ m} = 1 \text{ km}$$

A centimetre is 10 times longer than a millimetre.

A metre is 100 times longer than a centimetre.

A hectometre is 100 times longer than a metre.

A kilometre is 1000 times longer than a metre.

## Exercises

Copy and complete.

1.  $1 \text{ cm} = \blacksquare \text{ mm}$

2.  $1 \text{ m} = \blacksquare \text{ cm}$

3.  $1 \text{ hm} = \blacksquare \text{ cm}$

4.  $1 \text{ km} = \blacksquare \text{ m}$

5.  $4.5 \text{ cm} = \blacksquare \text{ mm}$

6.  $7.6 \text{ m} = \blacksquare \text{ cm}$

7.  $65 \text{ cm} = \blacksquare \text{ m}$

8.  $78 \text{ mm} = \blacksquare \text{ cm}$

9.  $950 \text{ m} = \blacksquare \text{ km}$

10.  $700 \text{ m} = \blacksquare \text{ hm}$

11.  $50 \text{ m} = \blacksquare \text{ hm}$

12.  $450 \text{ m} = \blacksquare \text{ hm}$

Choose the best unit of measure.

13.

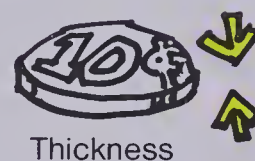


14.



Distance in 10 min

15.



Thickness

16.



Fingernail width

Estimate the length in centimetres.

Use your ruler to check.

17. \_\_\_\_\_

18. \_\_\_\_\_

19. \_\_\_\_\_

Choose the best answer.

20. The distance around the earth at the equator is:

(a) 40 000 km

(b) 40 000 m

(c) 40 km.



21. The distance across Canada is approximately:

(a) 5000 m

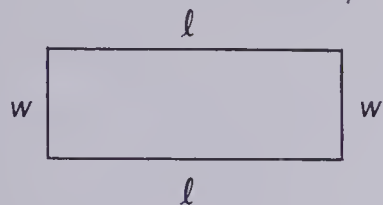
(b) 5000 hm

(c) 5000 km.



# Perimeter

**Perimeter** is the distance around a shape.

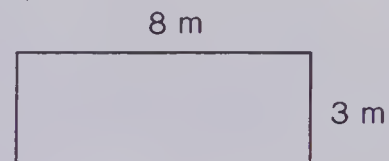


The length is  $l$  units.

The width is  $w$  units.

$$\text{Perimeter} = l + w + l + w$$

$$P = 2l + 2w$$



$$\text{Perimeter} = l + w + l + w$$

$$P = 8\text{ m} + 3\text{ m} + 8\text{ m} + 3\text{ m}$$

$$P = 22\text{ m}$$

or

$$\text{Perimeter} = 2l + 2w$$

$$P = 2 \times 8 + 2 \times 3$$

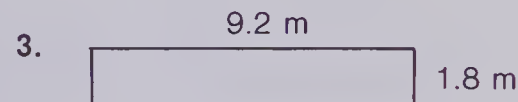
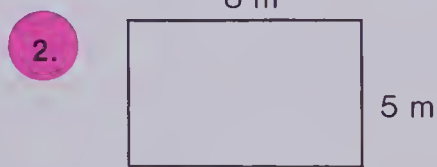
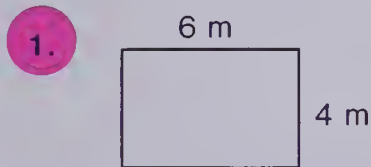
$$P = 22\text{ m}$$

The perimeter is 22 m.

## Exercises

Calculate the perimeter of each rectangle using the formula:

$$P = l + w + l + w \text{ or } P = 2l + 2w.$$

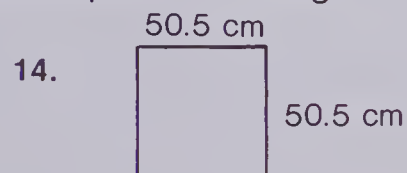
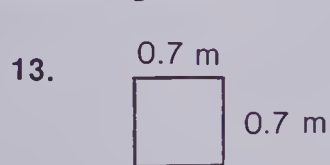
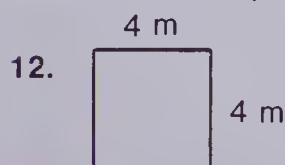


Draw a rectangle and label. Calculate the perimeter.

	Length	Width
4.	8 cm	4 cm
6.	13 cm	11 cm
8.	45 cm	28 cm
10.	192.6 m	86.9 m

	Length	Width
5.	16 cm	12 cm
7.	22 cm	19 cm
9.	17.8 m	23.3 m
11.	1.7 km	0.8 km

Calculate the perimeter of each rectangle. *Hint:* A square is a special rectangle.



15. Length: 84 cm; Width: 84 cm

16. Length: 750 m; Width: 750 m

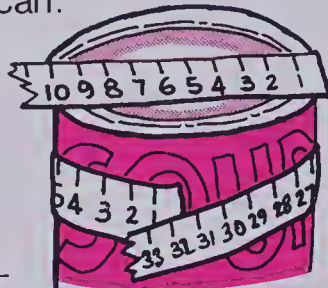


# Circumference

**Circumference** is the distance around a circle.

Henry measured the circumference and diameter of a circular can. He calculated the ratio:

$$\frac{\text{circumference}}{\text{diameter}} = \frac{31.5 \text{ cm}}{10 \text{ cm}} = 3.15$$



Mary Lou repeated the experiment with another can.

$$\frac{\text{circumference}}{\text{diameter}} = \frac{25.6 \text{ cm}}{8 \text{ cm}} = 3.2$$

The circumference of a circle is a little more than 3 times its diameter.

## Activity

1. Use a circular can. Repeat Henry's experiment.

$$\frac{\text{circumference}}{\text{diameter}} = \frac{\blacktriangle}{\blacksquare}$$

$$\text{Calculate: } \frac{\text{circumference}}{\text{diameter}} = \frac{\blacktriangle}{\blacksquare}$$

Copy and complete:

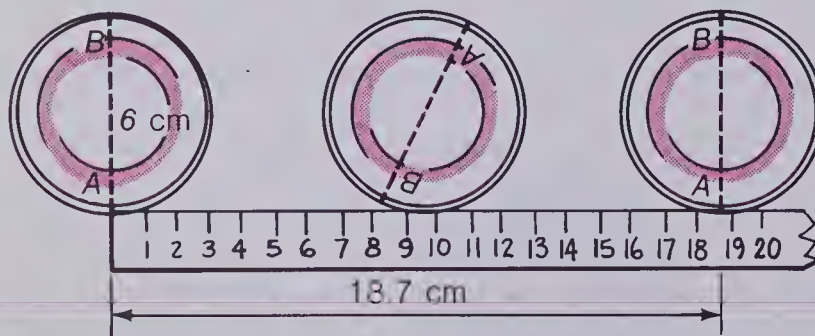
The circumference is a little more than  $\blacksquare$  times longer than its diameter.

2. Repeat Henry's experiment with another circular can. Calculate:  $\frac{\text{circumference}}{\text{diameter}} = \frac{\blacktriangle}{\blacksquare}$

Copy and complete:

The circumference is a little more than  $\blacksquare$  times longer than its diameter.

3. Tom marked and rolled a can to measure the circumference.



$$\frac{\text{circumference}}{\text{diameter}} = \frac{18.7}{6} = ?$$

Repeat Tom's experiment for several cans. Calculate this ratio for each:  $\frac{\text{circumference}}{\text{diameter}}$

# Pi

Mathematicians write the relations:  

$$\frac{\text{circumference of a circle}}{\text{diameter}} = \pi \text{ (Pi)}$$

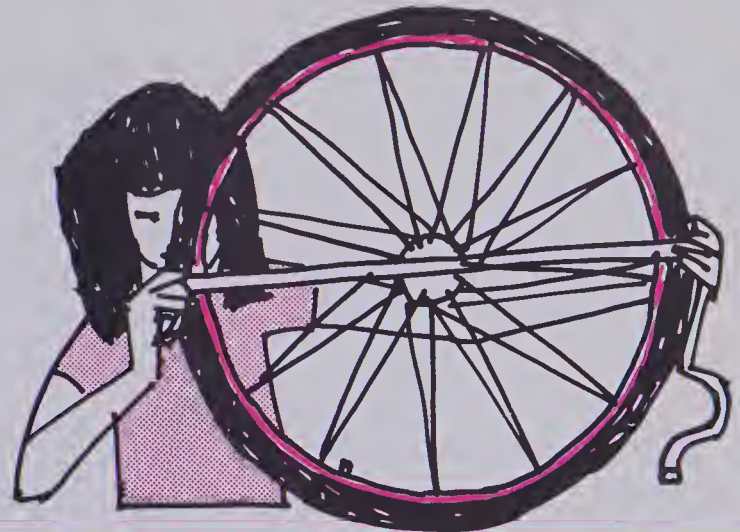
The number that  $\pi$  represents cannot be written exactly in decimal form.

We use  $\pi = 3.14$ .

We write for a circle:

$$C = \pi \times d$$

$$C = 3.14 \times d$$



## Exercises

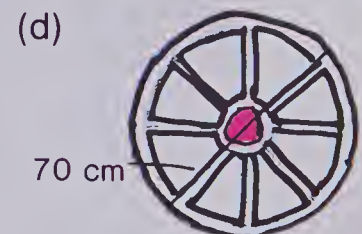
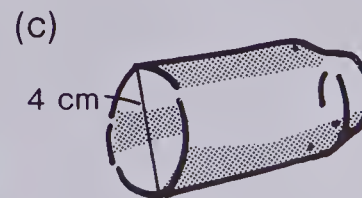
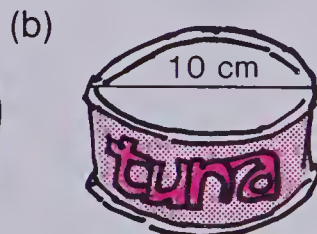
1. Copy and complete the chart.

Circular Can	Circumference (C)	Diameter (d)	$C \div d$ (2 decimals)
a	28.3 cm	9 cm	
b	19.2 cm	6 cm	
c	37.2 cm	12 cm	

2. Henry measured the diameter of 4 circular objects.

He knew the circumference was a little more than 3 times the diameter.

Calculate the approximate circumference of each.



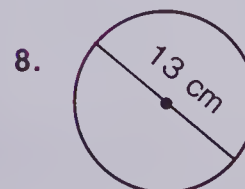
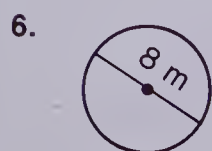
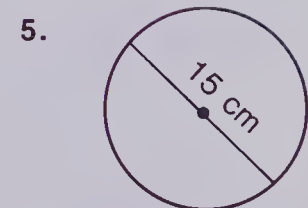
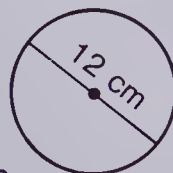
Calculate the circumference of each circle. Use  $\pi = 3.14$ .

3.  $C = \pi \times d$

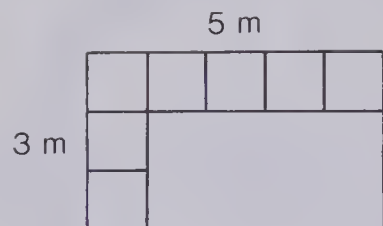
$C = 3.14 \times 12$

$C = \blacksquare \text{ cm}$

Circumference is  $\blacksquare \text{ cm}$ .



# Area of Rectangles

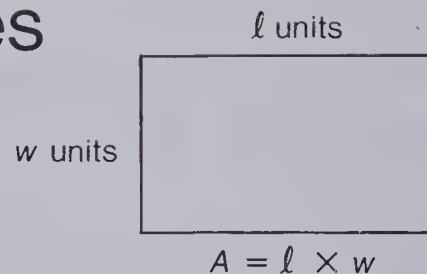


Area of 1 row =  $5 \text{ m}^2$ .

Area of 3 rows =  $5 \times 3 \text{ m}^2$ .

Area = length  $\times$  width

$$A = \ell \times w$$

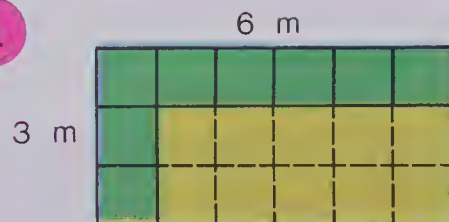


The area is  $15 \text{ m}^2$ . Note:  $\text{m}^2$  is read *square metres*.

## Exercises

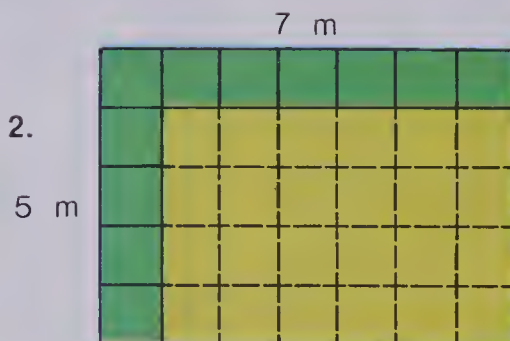
Find the area.

1.

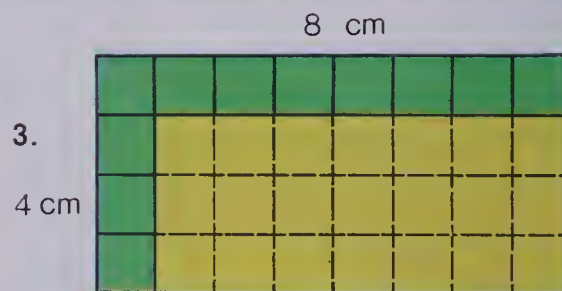


Area is  $\blacksquare \text{ m}^2$ .

2.



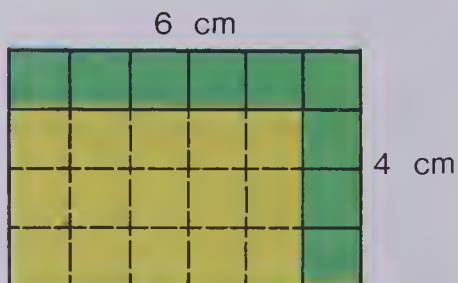
3.



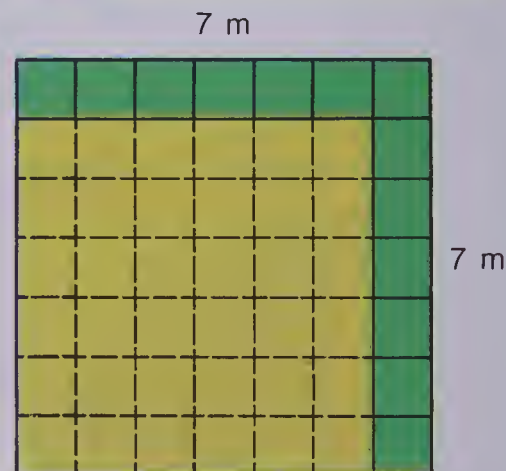
4.



5.

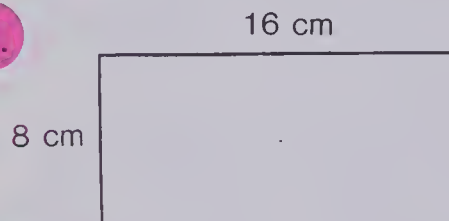


6.

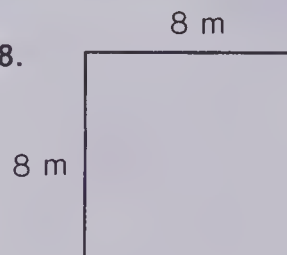


Calculate the area of each rectangle.

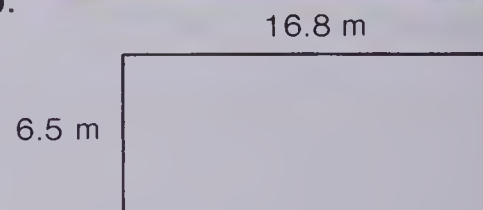
7.



8.



9.



10.

Length: 8 cm  
Width: 5 cm

11.

Length: 24 cm  
Width: 11 cm

12.

Length: 8.3 cm  
Width: 6.1 cm

13.

Length: 18.6 cm  
Width: 5.5 cm

14.

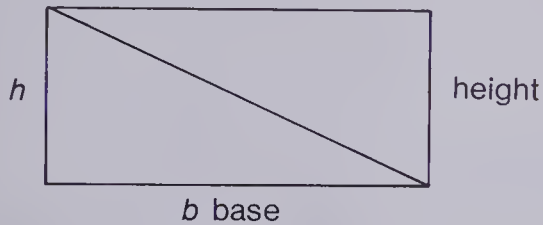
Length: 22.2 cm  
Width: 22.2 cm

15.

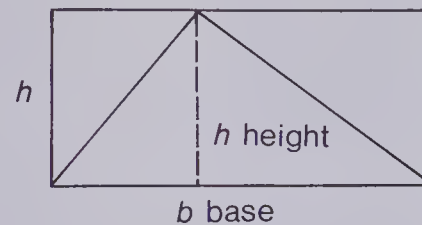
Length: 10 m  
Width: 10 m



# Area of Triangles



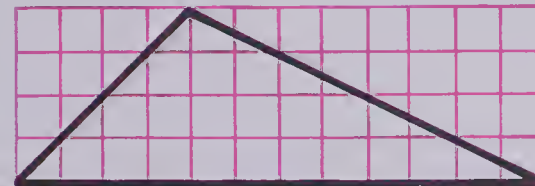
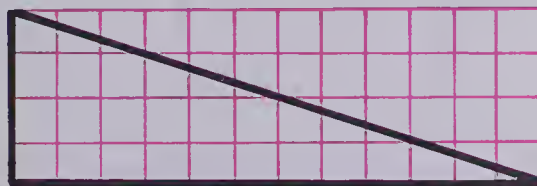
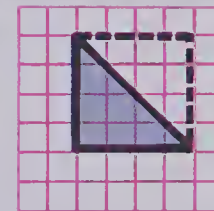
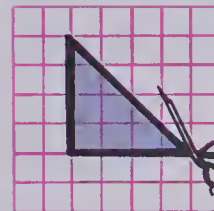
Area of rectangle = length  $\times$  width.  
 Area of triangle is  $\frac{1}{2}$  of the rectangle.  
 Area of triangle =  $\frac{1}{2} \times b \times h$ .



Area of the triangle is one half of the area of the rectangle with the same base and height.  
 Area of triangle =  $\frac{1}{2} \times b \times h$ .

## Activity

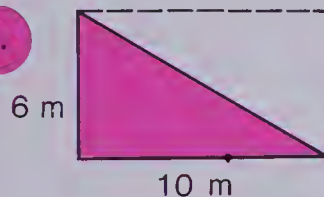
1. Cut out a right triangle from squared paper. Place it on a new piece of squared paper. Compare the areas of the triangle and the parallelogram you can make from it. Repeat for any triangle.
2. Count the squares. Is it true that the area of the triangle is one half the area of the rectangle?



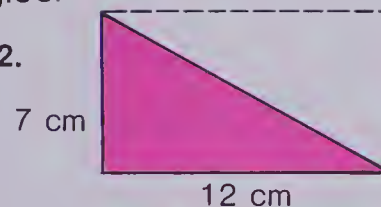
## Exercises

Calculate the area of these triangles.

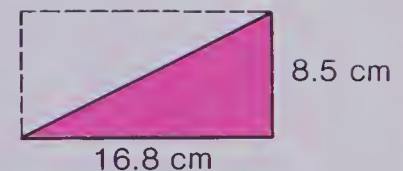
1.



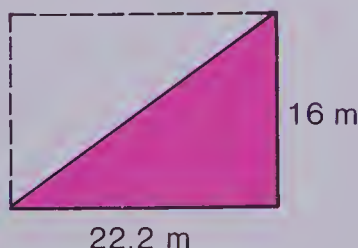
2.



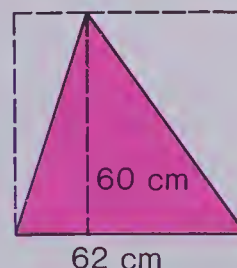
3.



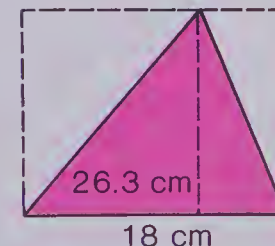
4.



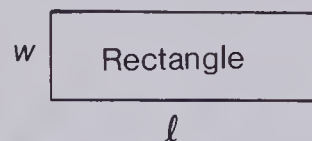
5.



6.



# Area of Parallelograms



$$A = \text{length} \times \text{width}$$



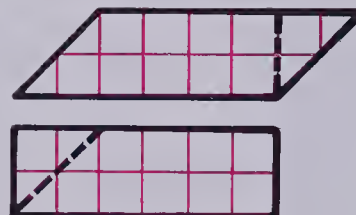
Area of the parallelogram is the same as the area of the rectangle with same base and height.

$$\text{Area} = \text{base} \times \text{height}$$

$$A = b \times h$$

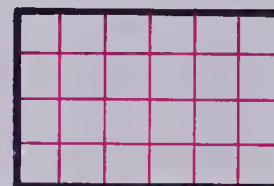
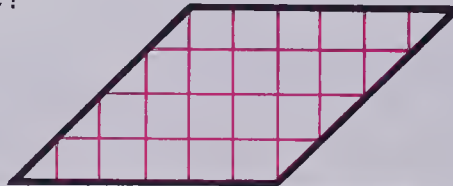
## Activities

1. Use squared paper.  
Draw and cut out a parallelogram.  
Cut off the one end and place it on the other end.



What is the length of the rectangle? the width? the area?

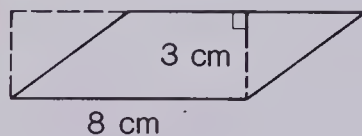
2. Count the squares of the rectangle and the parallelogram.  
How do they compare?



## Exercises

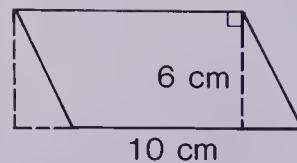
Calculate the area of each parallelogram.

1.

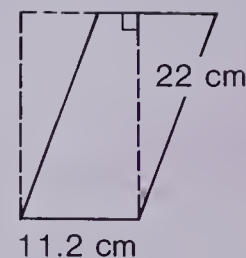


Area is  $\blacksquare \text{ cm}^2$ .

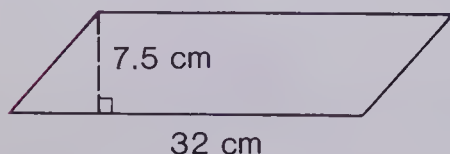
2.



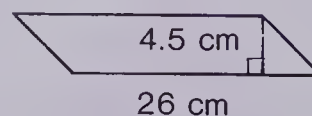
3.



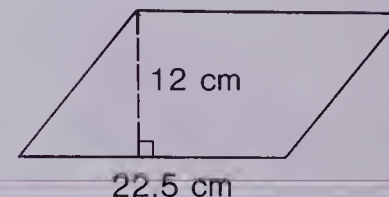
4.



5.

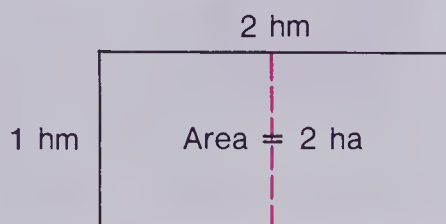
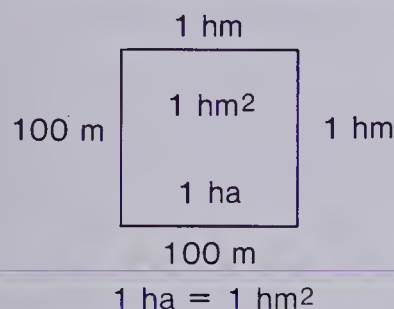


6.



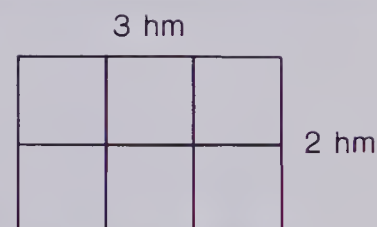
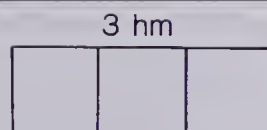
# The Hectare

The square metre ( $m^2$ ) is too small to measure land area.  
The square kilometre ( $km^2$ ) is too large for small land areas.  
Therefore the **hectare** (ha) is used for small land areas.

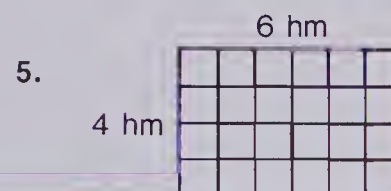
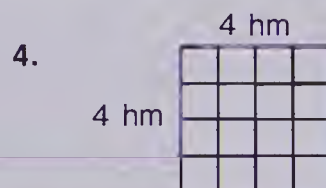
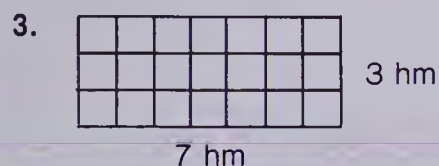


## Exercises

1. A city block is 3 hm long and 1 hm wide.  
How many hectares in the lot?
2. A city block is 3 hm long and 2 hm wide.  
How many hectares in the lot?



Calculate the area in hectares for each land area.



## BRAINTICKLER

Draw the pattern shown.

Continue to number around the spiral.

1. Is there a ray that contains:
  - (a) only the squares?
  - (b) only primes?
  - (c) only squares of prime numbers?
2. Predict what the corner numbers will be.

3. Note:

19	6
20	7

$$19 + 7 = 20 + 6$$

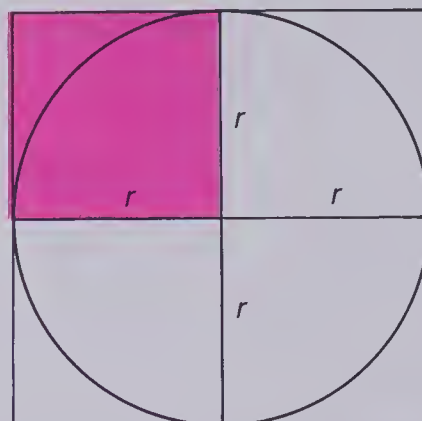
Does this pattern always hold?

	17	16	15	14	13
	18	5	4	3	12
	19	6	1	2	11
	20	7	8	9	10
	21	22	23		



# Area of a Circle

Compare the area of this square and the circle shown.

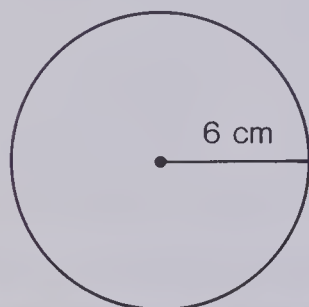


Area of shaded square is  
 $r \times r$ .

Area of large square is  
 $4 \times r \times r$ .

Area of circle is less than the area of large square.

$$\text{Area of circle} < 4 \times r \times r.$$



An approximation for the area of this circle is:

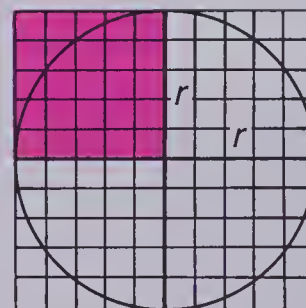
Area of circle  $< 4 \times r \times r$ . ( $r$  is the radius of the circle.)

Area of circle  $< 4 \times 6 \times 6$ .

Area of circle  $< 144 \text{ cm}^2$ .

## Exercises

1. (a) What is the area of the shaded square?
- (b) What is the area of the total large square?
- (c) How does the area of the circle compare with the area of the large square?



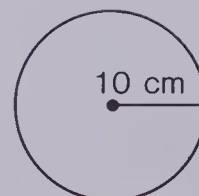
2. Use the relation  $\text{Area of circle} < 4 \times r \times r$  to find an approximation for the area of each circle.



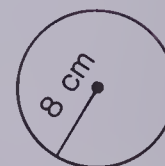
$A < \text{[ ]}$



$A < \text{[ ]}$



$A < \text{[ ]}$



$A < \text{[ ]}$

# More About Pi

Mathematicians write the relation:

$$\frac{\text{area of a circle}}{\text{radius} \times \text{radius}} = \pi \text{ (pi).}$$

The number that  $\pi$  represents is too long to write *exactly*.

$$\pi = 3.141\ 592\ 653\ 589\ 793\ 238\ 462\ 643\ 383\ 279\ \dots$$

We use  $\pi = 3.14$ . For a circle we write:  $A = \pi \times r \times r$

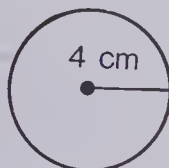
$$\text{or } A = 3.14 \times r \times r.$$



## Exercises

Calculate the area of each circle.

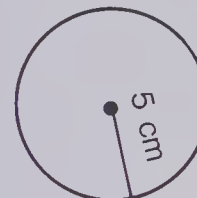
1.  $A = \pi \times r \times r$   
 $A = 3.14 \times 4 \times 4$   
 $A = \blacksquare \text{ cm}^2$   
 Area is  $\blacksquare \text{ cm}^2$ .



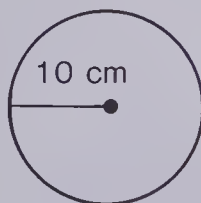
2.



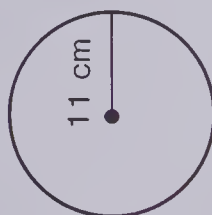
3.



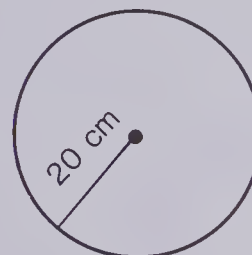
4.



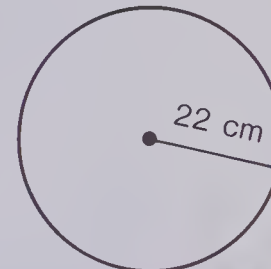
5.



6.



7.



8. A plate has a radius of 10 cm.  
 What is its area?

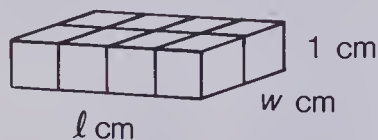
9. An outdoor fire pit used for bonfires has a radius of 0.8 m.  
 What is the area of its circular cover?

10. A circular dining room table has a radius of 0.4 m.  
 What is the area of the table top?

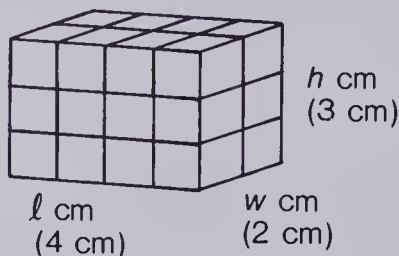
- ★ 11. Which is the better buy?  
 (a) A pizza with radius 8 cm for \$5.00.  
 (b) A pizza with radius 10 cm for \$6.50.



# Volume of Rectangular Prisms



Number of cubes in  
1 layer =  $l \times w$ .



Number of cubes in  
 $h$  layers =  $l \times w \times h$ .

$$V = l \times w \times h$$

$$V = 4 \times 2 \times 3$$

$$V = 24$$

Volume is  $24 \text{ cm}^3$ .

Note:  $\text{cm}^3$  is read  
*cubic centimetres*.

$$V = l \times w \times h$$

## Exercises

1. Find the volume of the box.

Number of cubic centimetres in 1 layer

Number of layers

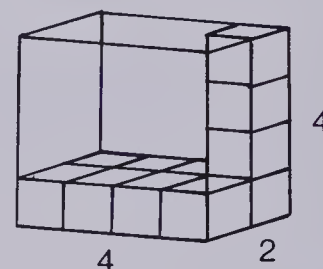
Number of cubic centimetres in box

Compare with this solution:

$$V = l \times w \times h$$

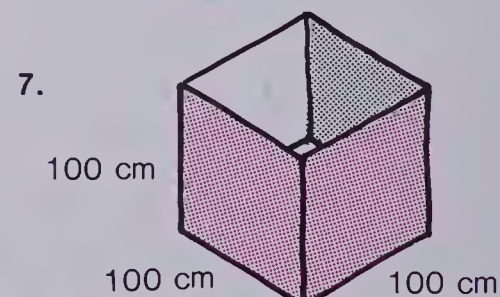
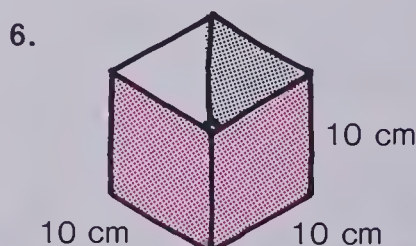
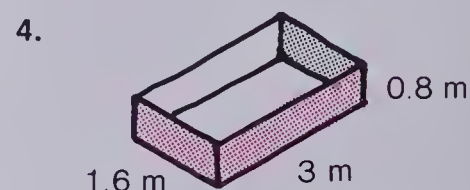
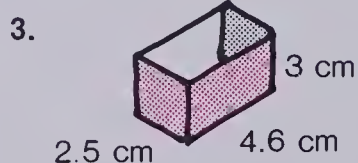
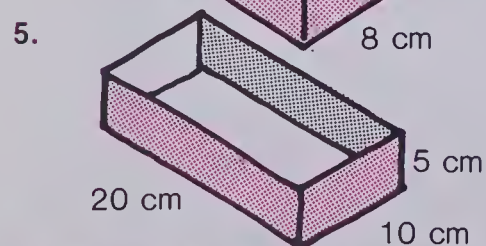
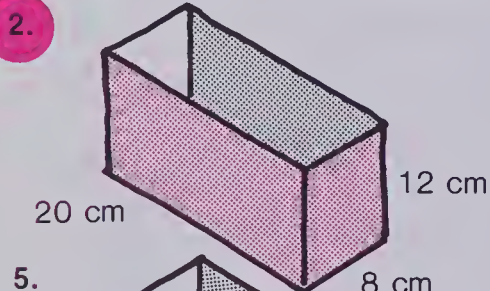
$$V = 4 \times \blacksquare \times \blacksquare$$

$$V = \blacksquare \text{ cm}^3$$



The volume of the box is  $\blacksquare \text{ cm}^3$ .

Calculate the volume of each box.

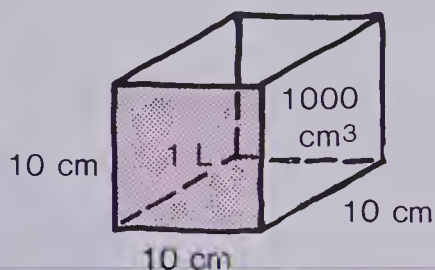
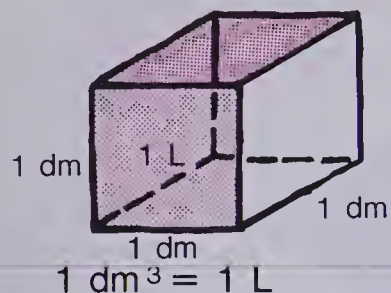


	Length	Width	Height
8.	12.3 cm	8 cm	6.2 cm
★ 10.	1 m	56 cm	40 cm

	Length	Width	Height
9.	2.8 m	4.5 m	10 m
★ 11.	1.1 m	1.1 m	1.1 m



# Litres and Cubic Centimetres



A container with a volume of  $1000 \text{ cm}^3$  will hold 1 L of water.

$$1000 \text{ cm}^3 = 1 \text{ L}$$

## Exercises

- What is the volume of each container?  
How many litres of water will each hold?

Copy and complete.

2. 1 L of water fills  $\blacksquare \text{ cm}^3$ .

4. 4 L of ginger ale fills  $\blacksquare \text{ cm}^3$ .

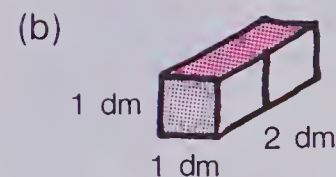
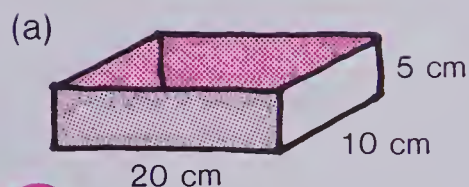
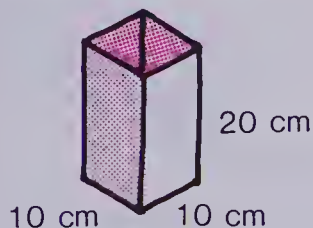
Copy and complete.

6.  $1000 \text{ cm}^3$  will hold  $\blacksquare \text{ L}$  of water.

8.  $2500 \text{ cm}^3$  will hold  $\blacksquare \text{ L}$  of water.

10.  $V = \blacksquare \text{ cm}^3$

It will hold  $\blacksquare \text{ L}$  of water.



3. 2 L of milk fills  $\blacksquare \text{ cm}^3$ .

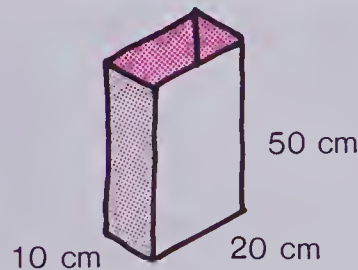
5. 3.5 L of water fills  $\blacksquare \text{ cm}^3$ .

7.  $5000 \text{ cm}^3$  will hold  $\blacksquare \text{ L}$  of water.

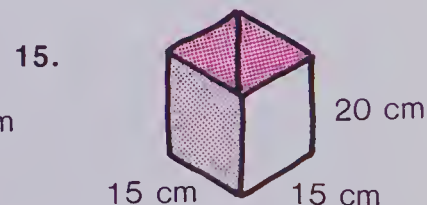
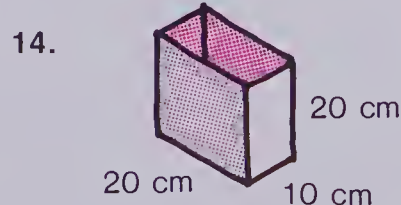
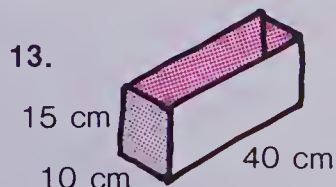
9.  $6500 \text{ cm}^3$  will hold  $\blacksquare \text{ L}$  of water.

11.  $V = \blacksquare \text{ cm}^3$

It will hold  $\blacksquare \text{ L}$  of water.



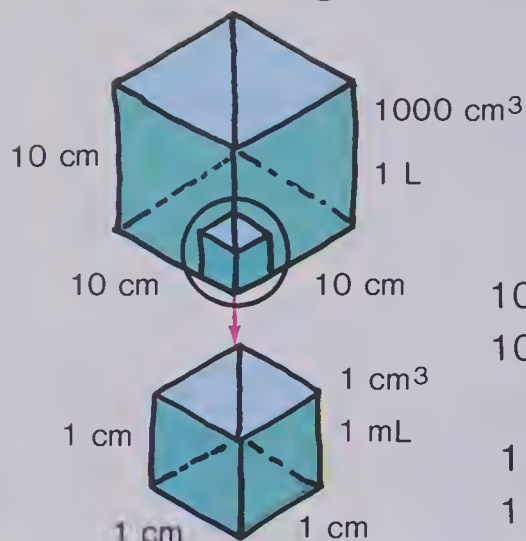
Calculate the number of cubic centimetres ( $\text{cm}^3$ ) and the number of litres (L).



- ★ 16. One litre of water has a mass of 1 kg.

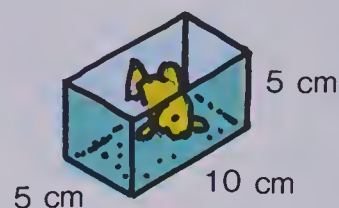
What is the mass of water that will fill a rectangular can that is 60 cm long, 30 cm wide, and 20 cm high?

# Cubic Centimetres and Millilitres



1000 cm<sup>3</sup> = 1 L  
 1000 cm<sup>3</sup> = 1000 mL  
 1 cm<sup>3</sup> = 1 mL  
 1 cm<sup>3</sup> will hold  
 1 mL of water.

How many litres of water will this small aquarium hold?



Volume =  $l \times w \times h$   
 Volume =  $10 \times 5 \times 5$

## Exercises

Copy and complete.

- 1 cm<sup>3</sup> will hold  mL of water.  
 3 cm<sup>3</sup> will hold  mL of water.  
 500 cm<sup>3</sup> will hold  mL of water.

- 1 mL of water fills  cm<sup>3</sup>.  
 10 mL of water fills  cm<sup>3</sup>.  
 600 mL of water fills  cm<sup>3</sup>.

How many cubic centimetres (cm<sup>3</sup>)? How many millilitres (mL)?

3. 3 cm

4 cm

15 cm

$V = \text{■ cm}^3$

It holds  mL of water.

4. 6 cm

8 cm

10 cm

$V = \text{■ cm}^3$

It holds  mL of water.

5. 4 cm

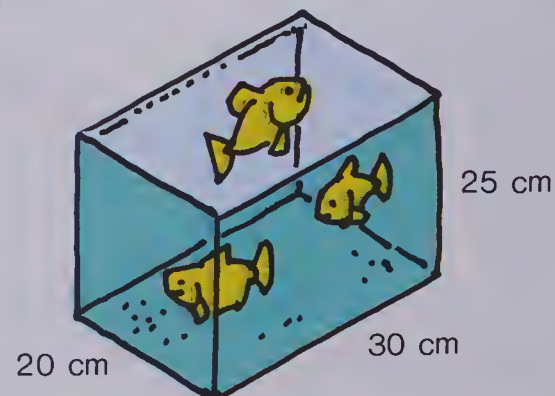
4 cm

25 cm

$V = \text{■ cm}^3$

It holds  mL of water.

- ★ 6. What is the mass of water in this aquarium?  
 Remember, 1 L of water has a mass of 1 kg.





# More About Litres

Oil is moved in huge tankers.  
A tanker may hold thousands of kilolitres.



150 000 kL of oil

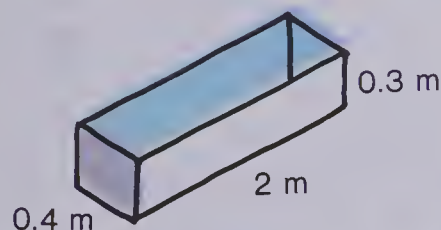
Milk is sold  
in litre containers.

$$1000 \text{ L} = 1 \text{ kL}$$

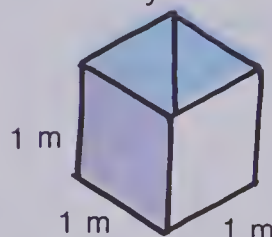
## Exercises

Tell whether each holds more, less, or exactly 1 kL.

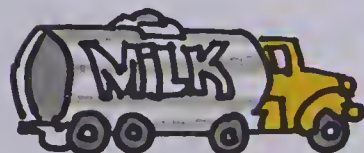
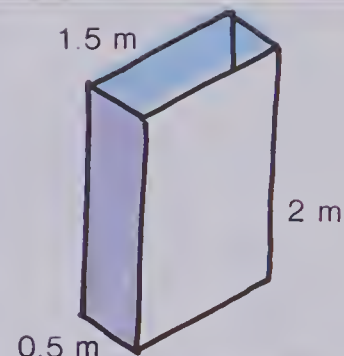
1.



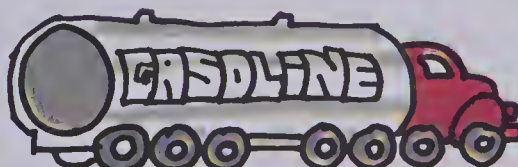
2.



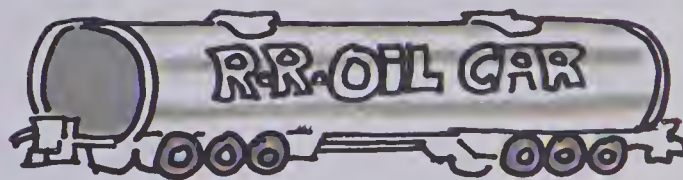
3.



About 30 kL of milk



About 100 kL of gasoline

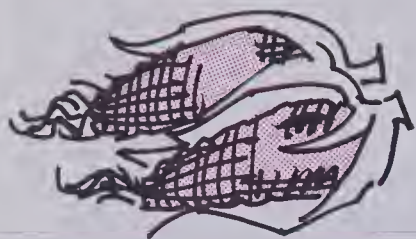


About 1000 kL of oil

4. How many milk-truck tanks would be needed to have a capacity equal to:  
(a) one gasoline-truck tank? (b) one railway-car tank?
5. How many gasoline-truck tanks would be needed to have a capacity equal to:  
(a) one railway-car tank? (b) the tanker at the top of the page?
6. A family uses 4 L of milk daily.  
How many litres of milk do they use in 10 weeks? Do they use 1 kL in 10 weeks?
7. A family uses 5 L of milk daily.  
How many litres of milk do they use in January, February, March, and April?  
Do they use 1 kL in the 4 months?
8. A tanker carrying 8940 kL of oil split in half off the coast of Japan. It lost its cargo.  
How many litres of oil were spilled?



# Truck Gardener



1 kg = 1000 g



1 t = 1000 kg

1000 g = 1 kg  
1000 kg = 1 t  
1 000 000 g = 1 t

## Exercises

Copy and complete.

- |                  |                  |                      |
|------------------|------------------|----------------------|
| 1. 1000 g = ■ kg | 2. 1000 kg = ■ t | 3. 1 000 000 g = ■ t |
| 500 g = ■ kg     | 500 kg = ■ t     | 500 000 g = ■ t      |
| 3000 g = ■ kg    | 8000 kg = ■ t    | 2 000 000 g = ■ t    |

Copy and complete.

- |               |               |               |
|---------------|---------------|---------------|
| 4. 2 kg = ■ g | 5. 1 t = ■ kg | 6. 5 kg = ■ g |
| 2.5 kg = ■ g  | 0.5 t = ■ kg  | 4 t = ■ kg    |
| 7.2 kg = ■ g  | 3.4 t = ■ kg  | 2500 g = ■ kg |

7. The mass of an apple is about 150 g.
- What is the mass in kilograms of 10 apples?
  - What is the mass in kilograms of 100 apples?
  - A box of apples has a mass of 20 kg.  
About how many apples are in the box?
8. The mass of a large tomato is about 170 g.
- What is the mass in kilograms of 10 tomatoes?
  - About how many tomatoes are in 5 kg?
9. The mass of an ear of corn is about 650 g.  
What is the mass in kilograms of 1000 ears?
10. A large potato has a mass of about 0.5 kg.
- How many potatoes are in a 50 kg bag?
  - How many bags are in 1 t?
11. An average watermelon has a mass of 15 kg.  
A truck delivers 6 t of watermelons.  
How many watermelons does the truck deliver?



- ★ 12. An average turnip has a mass of 1.8 kg.  
(a) How many turnips are in a 25 kg bag? (b) How many bags are in 1 t?
- ★ 13. Watermelons sell for 35¢/kg.  
The average mass of each watermelon is 18 kg.  
A truck has 260 melons.  
What is the load worth?
- ★ 14. The mass of a large orange is about 130 g.  
(a) What is the mass in kilograms of 150 oranges?  
(b) How many oranges are in a 40 kg carton?
- ★ 15. Peaches sell for 85¢/kg.  
The average peach has a mass of 160 g.  
One carton has 60 peaches.  
What is the price of the carton?
- ★ 16. The mass of the average pumpkin is 8 kg.  
A truck delivers 4.6 t of pumpkins.  
(a) How many pumpkins are in the shipment?  
(b) Pumpkins sell for 16¢/kg. What is the load worth?



## Tune Up

- A ping-pong ball has a mass of about:  
(a) 1 kg (b) 2 kg (c) 1 g (d) 100 g.
- A small car has a mass of about:  
(a) 1 kg (b) 100 kg (c) 1 t (d) 10 t.
- This text has a mass of about:  
(a) 1 g (b) 10 g (c) 1 kg (d) 100 g.
- Your mass is closest to:  
(a) 50 g (b) 500 g (c) 50 kg (d) 500 kg.
- The mass of a large carrot is about:  
(a) 1 g (b) 100 g (c) 1 kg (d) 100 kg.



# The Gardener



Gardeners care for lawns and plants. They mow, clip, prune, water, and spray as needed.

## Exercises

- The lawn needs sod.  
What is the area of the lawn, in square metres?

- Anna, the gardener, ordered  $430 \text{ m}^2$  of sod.  
It costs  $\$2.15/\text{m}^2$  (per square metre).  
What is the total price?

- Ted, Anna's partner, is building a fence around the lawn.  
How many metres of fence are required?

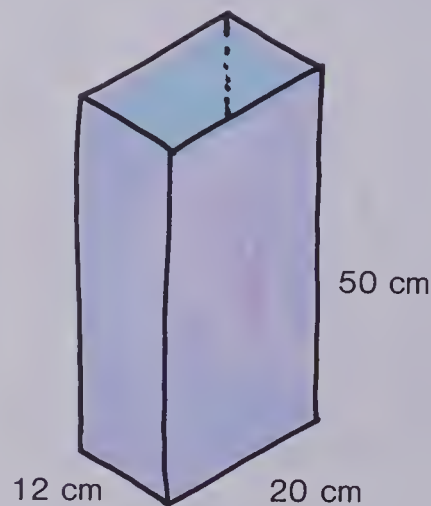
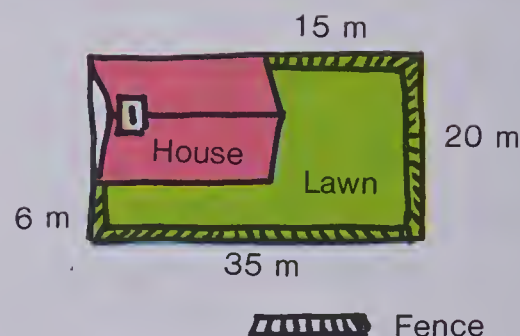
- Ted calculated a profit of  $\$2.75/\text{m}$  on the fence.  
What is the profit?

- To fertilize the lawn, they use 1 kg of fertilizer for each  $10 \text{ m}^2$ .  
How much fertilizer is required?

- They need 11 L of water to spray the plants.  
Does this container hold 11 L?

- ★ To mix the spray, Ted puts 20 mL of concentrate in 1 L of water.  
How many millilitres of concentrate must he use with 11 L of water?

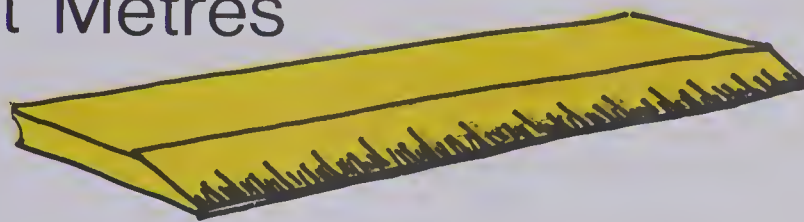
- ★ An *empty* container has a mass of 2 kg.  
What is the mass of the container *filled* with the spray liquid in Exercise 6?





# More About Metres

1 km = 1000 m	1 m = 10 dm
1 hm = 100 m	1 m = 100 cm
1 dam = 10 m	1 m = 1000 mm



$$2 \text{ km} + 3 \text{ hm} + 7 \text{ dam} + 8 \text{ m} = 2378 \text{ m}$$

8 m
70 m
300 m
2000 m
2378 m

$$3 \text{ m} + 9 \text{ dm} + 1 \text{ cm} + 6 \text{ mm} = 3.916 \text{ m}$$

3.	m
0.9	m
0.01	m
0.006	m
3.916	m

## Exercises

Write as metres.

1.  $3 \text{ km} + 4 \text{ hm} + 5 \text{ dam} + 2 \text{ m}$

$3 \text{ km} = 3000 \text{ m}$

$4 \text{ hm} = 400 \text{ m}$

$5 \text{ dam} = \blacksquare \text{ m}$

$2 \text{ m} = \blacksquare \text{ m}$

$\blacksquare \text{ m}$

3.  $7 \text{ km} + 0 \text{ hm} + 0 \text{ dam} + 3 \text{ m}$

5.  $2 \text{ km} + 0 \text{ hm} + 0 \text{ dam} + 0 \text{ m}$

7.  $4 \text{ m} + 2 \text{ dm} + 3 \text{ cm} + 5 \text{ mm}$

$4 \text{ m} = 4. \quad \text{m}$

$2 \text{ dm} = 0.2 \quad \text{m}$

$3 \text{ cm} = 0.0\blacksquare \text{ m}$

$5 \text{ mm} = 0.00\blacksquare \text{ m}$

9.  $9 \text{ m} + 3 \text{ dm} + 0 \text{ cm} + 4 \text{ mm}$

11.  $0 \text{ m} + 0 \text{ dm} + 4 \text{ cm} + 5 \text{ mm}$

13.  $9 \text{ m} + 9 \text{ dm} + 9 \text{ cm} + 3 \text{ mm}$

15.  $2 \text{ km} + 1 \text{ hm} + 2 \text{ dam} + 1 \text{ m}$

2.  $6 \text{ km} + 8 \text{ hm} + 9 \text{ dam} + 1 \text{ m}$

$6 \text{ km} = \blacksquare \text{ m}$

$8 \text{ hm} = \blacksquare \text{ m}$

$9 \text{ dam} = \blacksquare \text{ m}$

$1 \text{ m} = \blacksquare \text{ m}$

$\blacksquare \text{ m}$

4.  $8 \text{ km} + 1 \text{ hm} + 2 \text{ dam} + 0 \text{ m}$

6.  $1 \text{ km} + 2 \text{ hm} + 1 \text{ dam} + 3 \text{ m}$

8.  $1 \text{ m} + 3 \text{ dm} + 8 \text{ cm} + 9 \text{ mm}$

$1 \text{ m} = \blacksquare \text{ m}$

$3 \text{ dm} = \blacksquare \text{ m}$

$8 \text{ cm} = \blacksquare \text{ m}$

$9 \text{ mm} = \blacksquare \text{ m}$

10.  $6 \text{ m} + 9 \text{ dm} + 2 \text{ cm} + 1 \text{ mm}$

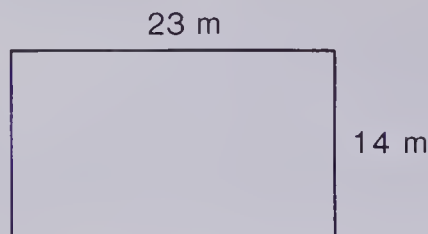
12.  $5 \text{ m} + 0 \text{ dm} + 8 \text{ cm} + 0 \text{ mm}$

14.  $6 \text{ km} + 3 \text{ hm} + 4 \text{ dam} + 5 \text{ m}$

16.  $4 \text{ m} + 0 \text{ dm} + 1 \text{ cm} + 2 \text{ mm}$

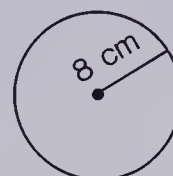
# Chapter Test

1. Calculate the perimeter.

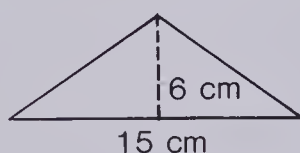


2. Calculate:

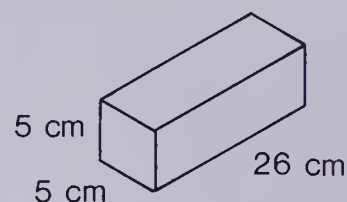
- (a) the circumference  
(b) the area (Use  $\pi = 3.14$ .)



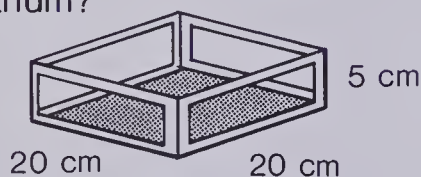
3. Calculate the area.



4. Calculate the volume.



5. How many litres in this aquarium?



6. The word meaning "1000 g" is .

7. The word meaning "one hundredth of a metre" is .

Copy and complete.

8.  $3000 \text{ g} = \text{■ kg}$

9.  $1.5 \text{ t} = \text{■ kg}$

10.  $500 \text{ L} = \text{■ kL}$

11.  $3 \text{ km} + 8 \text{ hm} + 0 \text{ dam} + 4 \text{ m} = \text{■ m}$

Divide.

12.  $\frac{3700}{10}$

13.  $\frac{6370}{100}$

14.  $\frac{90\ 000}{1000}$

15.  $4 \overline{)10.4}$

16.  $\frac{37.2}{6}$

17.  $6 \overline{)318}$

18.  $4 \overline{)8832}$

19.  $9 \overline{)738}$

20.  $8 \overline{)8968}$

21.  $100 \overline{)\$3700}$

22.  $52 \overline{)6448}$

23.  $68 \overline{)2100}$

24.  $31 \overline{)3131}$

25.  $44 \overline{)8888}$

26.  $38 \overline{)87.4}$

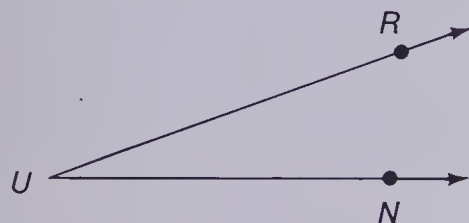
27.  $27 \overline{)97.2}$

28.  $68 \overline{)\$653.48}$

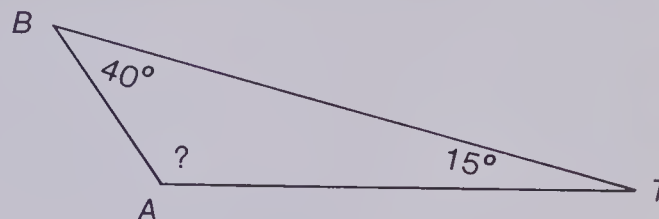
29.  $33 \overline{)\$153.12}$

# Cumulative Review

1. Use a protractor. What is the measure of  $\angle RUN$ ?



2. Calculate the measure of  $\angle BAT$ .



Calculate.

$$\begin{array}{r} 3. \quad 45.6 \\ 3.76 \\ + 431. \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 76\,030 \\ + 14\,909 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad \$408.00 \\ - 124.46 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 361 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 764 \\ \times 51 \\ \hline \end{array}$$

$$8. \quad 15\,050 - 7462$$

$$9. \quad 123 \times 0$$

$$10. \quad 14.3 \times 10$$

$$11. \quad 174 \div 100$$

$$12. \quad 5 \times (7 \times 8)$$

$$13. \quad 6 \times 5 = 40 - \blacksquare$$

$$\begin{array}{r} 14. \quad 3427 \\ \times 0.2 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \quad 0.3 \\ \times 0.8 \\ \hline \end{array}$$

$$\begin{array}{r} 16. \quad 84 \\ \times 0.75 \\ \hline \end{array}$$

$$\begin{array}{r} 17. \quad 1.24 \\ \times 0.25 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \quad 0.03 \\ \times 0.02 \\ \hline \end{array}$$

$$19. \quad \frac{93\,000}{1000}$$

$$20. \quad 34 \overline{)76\,194}$$

$$21. \quad 7 \overline{)3200}$$

$$22. \quad 3 \overline{)12.6}$$

$$23. \quad 28 \overline{)19.6}$$

24. A tailor bought 250 cm of velvet cloth for \$15.50.  
How many metres of cloth did he buy?

25. At a scout rally, 104 scouts came from Manitoba, 285 came from Ontario, and 8 came from British Columbia.

Give an estimate of the number of scouts at the rally.



# Chapter 5

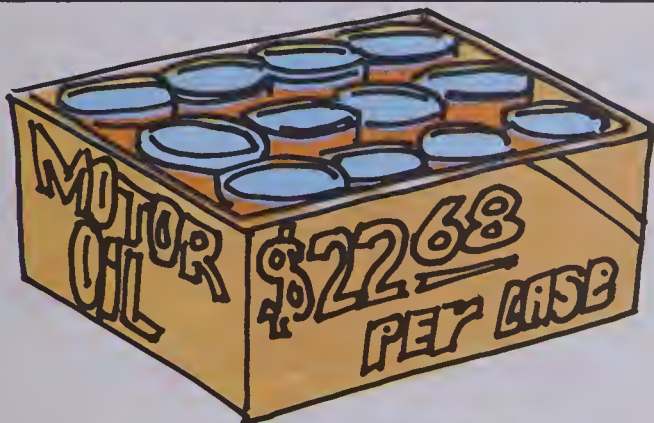
# Division and Measurement

Division by Decimals

Time and Temperature



# Division



What is the cost of 1 can?



Tape Length	Price
45 min	\$2.79
60 min	\$2.99
90 min	\$3.99
120 min	\$4.39

What is the average price of the tapes?



There are 50 dimes in 1 roll.  
There are 2857 dimes.  
How many rolls?  
How many dimes left over?



There are 3476 chairs for the concert.  
There are 27 chairs in each row.  
How many rows?  
How many chairs left over?

Phone bill for:	Amount:
March	\$12.96
April	7.59
May	22.63
June	8.27
July	17.30

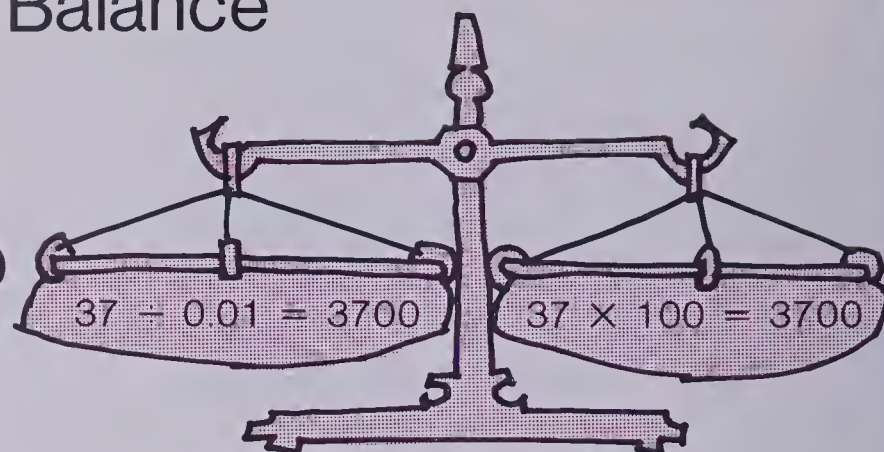
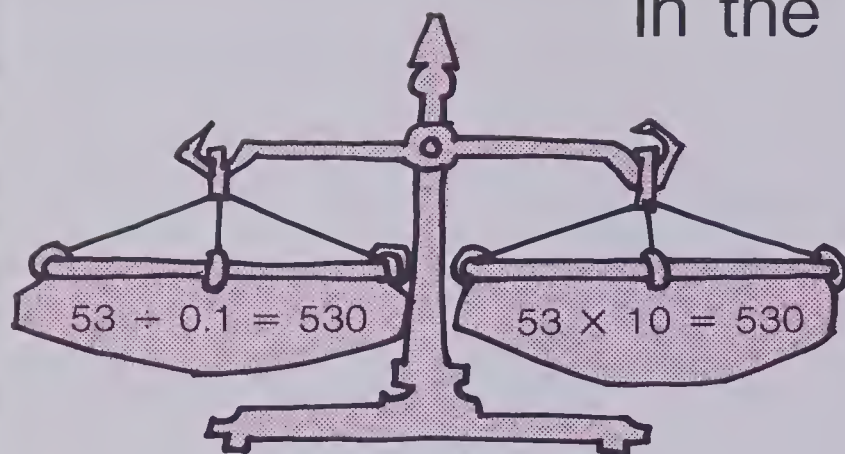
What is the average phone bill for these months?  
How much less than \$20.00 is the average phone bill?



How much is taken off the price of the bird?  
What is the price of the bird now?



# In the Balance



Explain what each set of balances shows.

What rule helps you  
to divide by 0.1? by 0.01?

## Exercises

1. Complete these "balances". Use your rules.

(a)  $18 \div 0.1 = \blacksquare$   
 $18 \times 10 = \blacksquare$

(b)  $9 \div 0.1 = \blacksquare$   
 $9 \times 10 = \blacksquare$

(c)  $152 \div 0.1 = \blacksquare$   
 $152 \times 10 = \blacksquare$

(d)  $35 \div 0.01 = \blacksquare$   
 $35 \times 100 = \blacksquare$

(e)  $7 \div 0.01 = \blacksquare$   
 $7 \times 100 = \blacksquare$

(f)  $289 \div 0.01 = \blacksquare$   
 $289 \times 100 = \blacksquare$

2. Divide by 0.1.

(a) 24

(b) 126

(c) 3

(d) 17

(e) 458

(f) 19

(g) 5

(h) 60

(i) 1

(j) 10

3. Divide by 0.01.

(a) 16

(b) 5

(c) 219

(d) 28

(e) 186

(f) 2

(g) 67

(h) 70

(i) 10

(j) 101

4. Divide.

(a)  $37 \div 0.01$

(b)  $507 \div 0.1$

(c)  $281 \div 0.1$

(d)  $54 \div 0.01$



# Patterns in Division

Investigate these pattern boards.

$$53 \div 1 = 53$$

$$53 \div 0.1 = 530$$

$$53 \div 0.01 = 5300$$

$$4 \div 1 = 4$$

$$4 \div 0.1 = 40$$

$$4 \div 0.01 = 400$$

$$2.5 \div 1 = 2.5$$

$$2.5 \div 0.1 = 25$$

$$2.5 \div 0.01 = 250$$

What happens to the decimal point in the quotient when you divide by 1? by 0.1? by 0.01?

Make a "decimal rule".

## Exercises

Complete these patterns.

1.  $26 \div 1 = 26$

$26 \div 0.1 = \blacksquare$

$26 \div 0.01 = \blacksquare$

2.  $9 \div 1 = \blacksquare$

$9 \div 0.1 = \blacksquare$

$9 \div 0.01 = \blacksquare$

3.  $5.8 \div 1 = \blacksquare$

$5.8 \div 0.1 = \blacksquare$

$5.8 \div 0.01 = \blacksquare$

4.  $30 \div 1 = \blacksquare$

$30 \div 0.1 = \blacksquare$

$30 \div 0.01 = \blacksquare$

5.  $1 \div 1 = \blacksquare$

$1 \div 0.1 = \blacksquare$

$1 \div 0.01 = \blacksquare$

6.  $10 \div 1 = \blacksquare$

$10 \div 0.1 = \blacksquare$

$10 \div 0.01 = \blacksquare$

Divide by 0.1.

7. 83

8. 6

9. 50

10. 392

11. 100

Divide by 0.01.

12. 41

13. 2

14. 70

15. 505

16. 100

Complete these patterns.

★ 17.  $116 \div 0.1 = \blacksquare$

$16 \div 0.1 = \blacksquare$

$1.6 \div 0.1 = \blacksquare$

$1.16 \div 0.1 = \blacksquare$

★ 18.  $74 \div 0.01 = \blacksquare$

$7 \div 0.01 = \blacksquare$

$7.4 \div 0.01 = \blacksquare$

$0.7 \div 0.01 = \blacksquare$

# Ribbon Awards

Miss Carter made awards from ribbon for field day.

Each award measured 0.1 m.

How many awards did Miss Carter make from 3 m of ribbon?

$$0.1 \overline{)3} = \frac{3}{0.1}$$

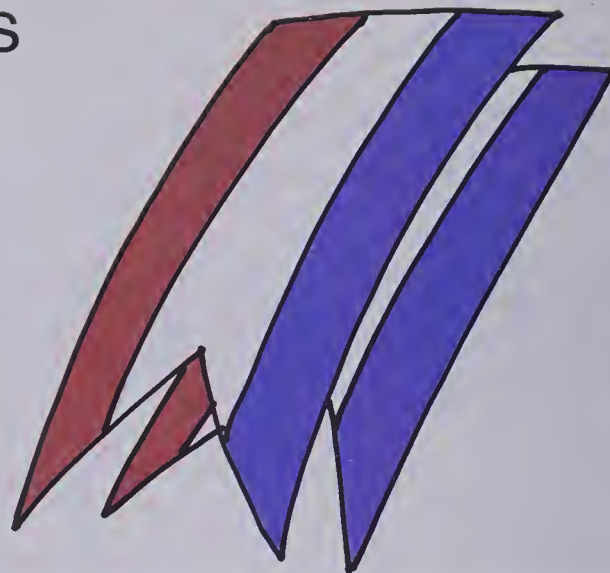
Multiply the numerator and denominator by 10.

$$\frac{3 \times 10}{0.1 \times 10} = \frac{30}{1} = 30$$

Short cut:

$$0.1 \overline{)3.0} \rightarrow 1 \overline{)30.}$$

She made 30 award ribbons.



## Exercises

1. Copy and complete.

(a)  $0.1 \overline{)8} \rightarrow 1 \overline{)80}$

(b)  $0.1 \overline{)70} \rightarrow 1 \overline{)70}$

(c)  $0.1 \overline{)4} \rightarrow 1 \overline{)40}$

(d)  $0.1 \overline{)2} \rightarrow 1 \overline{)20}$

(e)  $0.1 \overline{)6} \rightarrow 1 \overline{)60}$

2. Divide.

(a)  $0.1 \overline{)3}$

(b)  $0.1 \overline{)9}$

(c)  $0.1 \overline{)5}$

(d)  $0.1 \overline{)1}$

3. Divide.

(a)  $0.1 \overline{)52} \rightarrow 1 \overline{)520}$

(b)  $0.1 \overline{)76}$

(c)  $0.1 \overline{)85}$

(d)  $0.1 \overline{)37}$

4. Divide.

(a)  $0.1 \overline{)726} \rightarrow 1 \overline{)7260}$

(b)  $0.1 \overline{)857}$

(c)  $0.1 \overline{)407}$

(d)  $0.1 \overline{)663}$

5. Divide.

(a)  $0.1 \overline{)23}$

(b)  $0.1 \overline{)6852}$

(c)  $0.1 \overline{)447}$

(d)  $0.1 \overline{)750}$

6. Greta cut 4 m of ribbon for awards.

Each award measured 0.1 m.

How many awards can she make?

# Bazaar

Mrs. Jones bought 18 m of material to make aprons for the bazaar.  
She used 0.9 m of material for each apron.  
How many aprons did she make?

$$0.9 \overline{)18} = \frac{18}{0.9}$$

Multiply the numerator  
and denominator by 10.

$$\frac{18 \times 10}{0.9 \times 10} = \frac{180}{9} = 20$$

Short cut:

$$0.9 \overline{)18.0} \rightarrow 9 \overline{)180.} \quad \text{20.}$$

She made 20 aprons.



## Exercises

1. Copy and complete.

$$(a) \quad 0.2 \overline{)12} \rightarrow 2 \overline{)120} \quad \begin{matrix} \blacksquare \blacksquare \end{matrix}$$

$$(b) \quad 0.4 \overline{)16} \rightarrow 4 \overline{)160} \quad \begin{matrix} \blacksquare \blacksquare \end{matrix}$$

$$(c) \quad 0.3 \overline{)24} \rightarrow 3 \overline{)240} \quad \begin{matrix} \blacksquare \blacksquare \end{matrix}$$

$$(d) \quad 0.7 \overline{)49} \rightarrow 7 \overline{) \begin{matrix} \blacksquare \blacksquare \\ \blacksquare \blacksquare \blacksquare \blacksquare \end{matrix}}$$

$$(e) \quad 0.3 \overline{)18} \rightarrow 3 \overline{) \begin{matrix} \blacksquare \blacksquare \\ \blacksquare \blacksquare \blacksquare \blacksquare \end{matrix}}$$

$$(f) \quad 0.6 \overline{)54} \rightarrow 6 \overline{) \begin{matrix} \blacksquare \blacksquare \\ \blacksquare \blacksquare \blacksquare \blacksquare \end{matrix}}$$

Divide.

2. (a)  $0.4 \overline{)32}$

(b)  $0.9 \overline{)63}$

(c)  $0.7 \overline{)56}$

(d)  $0.2 \overline{)14}$

(e)  $0.8 \overline{)208}$

(f)  $0.3 \overline{)135}$

(g)  $0.5 \overline{)365}$

(h)  $0.6 \overline{)336}$

3. (a)  $0.8 \overline{)2136}$

(b)  $0.5 \overline{)4465}$

(c)  $0.2 \overline{)1326}$

(d)  $0.7 \overline{)4011}$

(e)  $0.4 \overline{)1068}$

(f)  $0.9 \overline{)2259}$

(g)  $0.8 \overline{)4192}$

(h)  $0.6 \overline{)5352}$

4. Mr. Park used 24 m of cloth to make barbecue aprons.  
He used 0.8 m for each one.  
How many aprons did he make?



# Math Time

Danny answered 15 math questions in 2.5 min.

What was the average number of questions he answered in 1 min?

$$2.5 \overline{)15} = \frac{15}{2.5}$$

Write an equivalent fraction

with the denominator a whole number:

$$\frac{15 \times 10}{2.5 \times 10} = \frac{150}{25}$$

$$= 6$$

Short cut:

$$2.5 \overline{)15} \rightarrow 25 \overline{)150}^6$$

Danny answered an average of 6 questions each minute.

## Exercises

1. Divide.

(a)  $2.1 \overline{)63}$

(b)  $4.7 \overline{)94}$

(c)  $2.4 \overline{)96}$

(d)  $3.4 \overline{)68}$

(e)  $1.3 \overline{)65}$

(f)  $3.2 \overline{)96}$

(g)  $2.8 \overline{)84}$

(h)  $4.2 \overline{)84}$

(i)  $1.5 \overline{)60}$

(j)  $2.7 \overline{)81}$

(k)  $3.7 \overline{)37}$

(l)  $2.3 \overline{)92}$

2. Find the quotient.

(a)  $4.8 \overline{)432}$

(b)  $2.6 \overline{)156}$

(c)  $6.1 \overline{)427}$

(d)  $3.5 \overline{)175}$

(e)  $2.9 \overline{)203}$

(f)  $5.6 \overline{)448}$

(g)  $4.3 \overline{)387}$

(h)  $8.6 \overline{)602}$

(i)  $9.8 \overline{)588}$

(j)  $7.3 \overline{)365}$

(k)  $8.2 \overline{)328}$

(l)  $2.7 \overline{)216}$

3. Divide.

(a)  $5.5 \overline{)3465}$

(b)  $5.9 \overline{)3835}$

(c)  $9.6 \overline{)7968}$

(d)  $9.4 \overline{)7520}$

(e)  $2.9 \overline{)2001}$

(f)  $6.8 \overline{)3196}$

(g)  $5.4 \overline{)5130}$

(h)  $3.9 \overline{)1521}$

(i)  $2.3 \overline{)1288}$

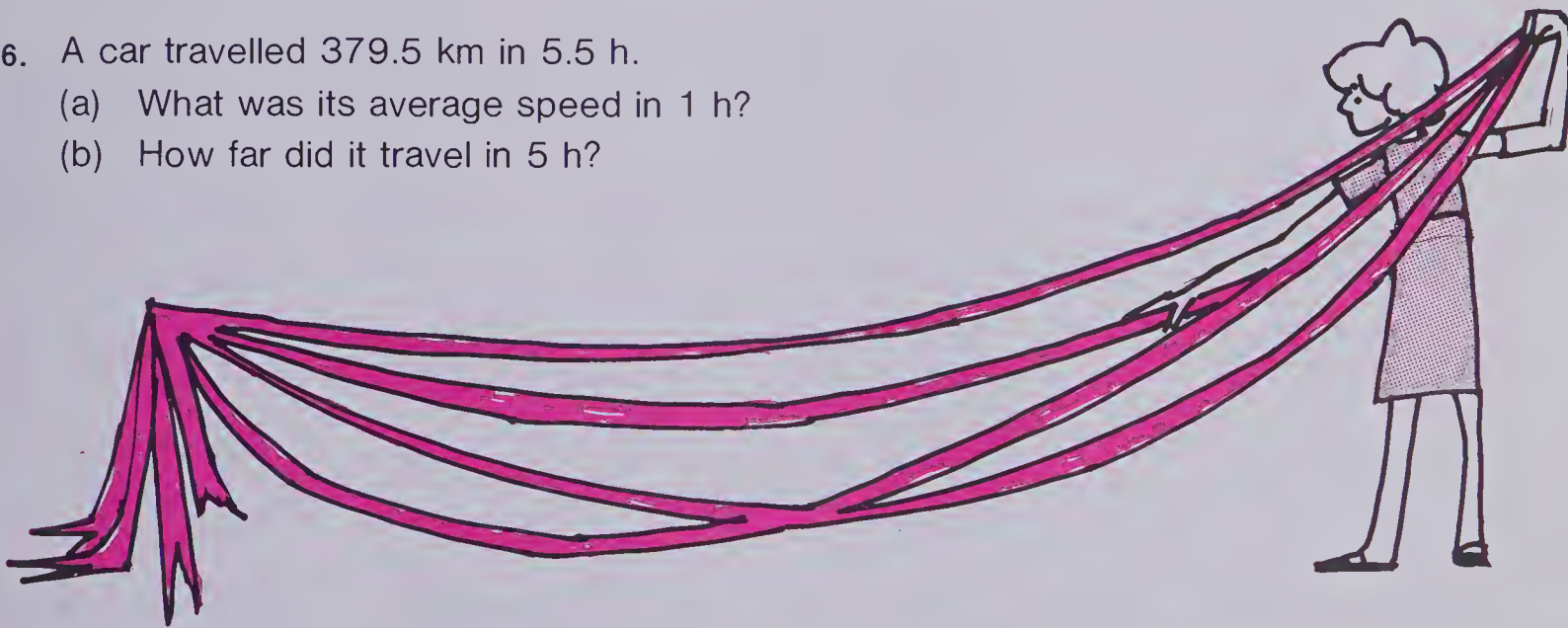
(j)  $6.7 \overline{)1742}$

(k)  $9.5 \overline{)4085}$

(l)  $4.3 \overline{)1204}$

Solve these problems that Danny answered in his math class.

4. (a) How many small spice packets with a mass of 2.5 g each can be made from a large spice packet with a mass of 215 g?
- (b) Each small packet sells for \$1.15.  
What is the total selling price of all the small packets?
5. (a) Susan made streamers from coloured ribbon.  
How many streamers that measure 1.5 m each can she make from a roll of ribbon 36 m long?
- (b) She needed 50 streamers.  
How many more streamers did she have to make?
- ★ 6. A car travelled 379.5 km in 5.5 h.
- (a) What was its average speed in 1 h?
- (b) How far did it travel in 5 h?



## BRAINTICKLER

A small insect is creeping up a twig that measures 12 cm.  
It creeps 3 cm in the daytime.  
Each night it slips back 2 cm.  
How many days does it take to creep to the top of the twig?



# Berry Picking

Bill picked 17.5 baskets of berries in 3.5 h.

What was the average number of baskets he picked in 1 h?

$$3.5 \overline{)17.5} = \frac{17.5}{3.5}$$

Write an equivalent fraction with the denominator a whole number:

$$\frac{17.5 \times 10}{3.5 \times 10} = \frac{175}{35}$$

$$= 5$$

Bill picked an average of 5 baskets each hour.

Short cut:

$$3.5 \overline{)17.5} \rightarrow 35 \overline{)175}$$



## Exercises

Find the quotient.

1. (a)  $3.1 \overline{)27.9} \rightarrow 31 \overline{)279}$  (b)  $4.3 \overline{)34.4}$  (c)  $2.7 \overline{)16.2}$  (d)  $4.6 \overline{)36.8}$   
 (e)  $6.4 \overline{)44.8}$  (f)  $7.8 \overline{)23.4}$  (g)  $8.7 \overline{)52.2}$  (h)  $9.2 \overline{)64.4}$   
 (i)  $8.9 \overline{)80.1}$  (j)  $5.3 \overline{)42.4}$  (k)  $4.8 \overline{)14.4}$  (l)  $7.9 \overline{)63.2}$   
 (m)  $4.4 \overline{)30.8}$  (n)  $9.6 \overline{)57.6}$  (o)  $7.8 \overline{)70.2}$  (p)  $6.3 \overline{)50.4}$

2. (a)  $5.3 \overline{)12.72} \rightarrow 53 \overline{)127.2}$  (b)  $6.2 \overline{)34.72}$  (c)  $4.9 \overline{)42.14}$   

$$\begin{array}{r} 2.4 \\ 53 \overline{)127.2} \\ \underline{106} \\ 212 \\ \underline{212} \\ 0 \end{array}$$
 (d)  $8.1 \overline{)55.08}$  (e)  $7.3 \overline{)50.37}$

- (f)  $9.5 \overline{)61.75}$  (g)  $8.4 \overline{)40.32}$  (h)  $2.9 \overline{)28.42}$  (i)  $8.2 \overline{)37.72}$   
 (j)  $48.84 \div 6.6$  (k)  $39.33 \div 5.7$  (l)  $57.62 \div 8.6$  (m)  $43.61 \div 4.9$

3. A car uses 8.1 L of gasoline to travel 89.1 km.  
 How far does the car travel on 1 L of gasoline?



# Stacking Paper

Packages of paper are stacked against a wall.

One package is 0.01 m thick.

The height of a stack is 2 m.

How many packages of paper are in the stack?

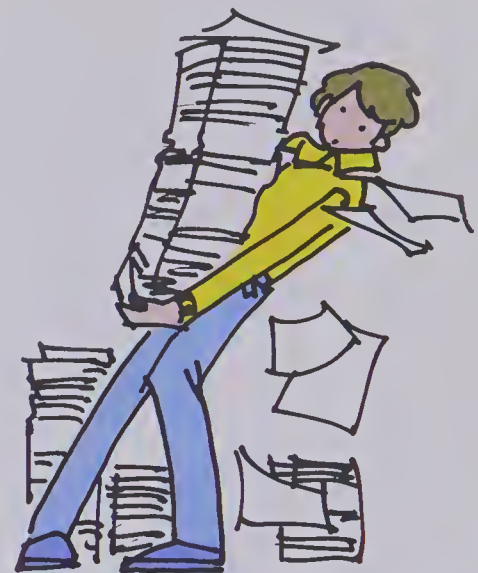
$$0.01 \overline{)2} = \frac{2}{0.01}$$

Write an equivalent fraction with a whole number as denominator:

$$\frac{2 \times 100}{0.01 \times 100} = \frac{200}{1} = 200$$

Short cut:

$$0.01 \overline{)2.00} \rightarrow 1 \overline{)200}$$



There are 200 packages in the stack.

## Exercises

Divide.

1.  $0.01 \overline{)9} \rightarrow 1 \overline{)900}$       2.  $0.01 \overline{)3}$       3.  $0.01 \overline{)18}$       4.  $0.01 \overline{)27}$

5.  $0.01 \overline{)200}$       6.  $0.01 \overline{)859}$       7.  $0.01 \overline{)111}$       8.  $0.01 \overline{)100}$

9.  $0.01 \overline{)0.74}$       10.  $0.01 \overline{)0.83}$       11.  $0.01 \overline{)0.57}$       12.  $0.01 \overline{)0.42}$

13.  $0.01 \overline{)0.68}$       14.  $0.01 \overline{)0.91}$       15.  $0.01 \overline{)0.25}$       16.  $0.01 \overline{)0.64}$

Find the quotient.

17.  $0.01 \overline{)4.83}$       18.  $0.01 \overline{)9.72}$       19.  $0.01 \overline{)16.39}$       20.  $0.01 \overline{)10.24}$

21.  $0.01 \overline{)6.17}$       22.  $0.01 \overline{)88.72}$       23.  $0.01 \overline{)147.28}$       24.  $0.01 \overline{)500.45}$

25.  $0.01 \overline{)6.748}$       26.  $0.01 \overline{)9.463}$       27.  $0.01 \overline{)46.005}$       28.  $0.01 \overline{)500.2}$

★ 29.  $0.01 \overline{)620.771}$       ★ 30.  $0.01 \overline{)718.428}$       ★ 31.  $0.01 \overline{)38.444}$       ★ 32.  $0.01 \overline{)947.3}$

33. Each notebook is 0.01 m thick.  
The stack of notebooks is 2.54 m high.  
How many notebooks in the stack?



# Rods and Wires

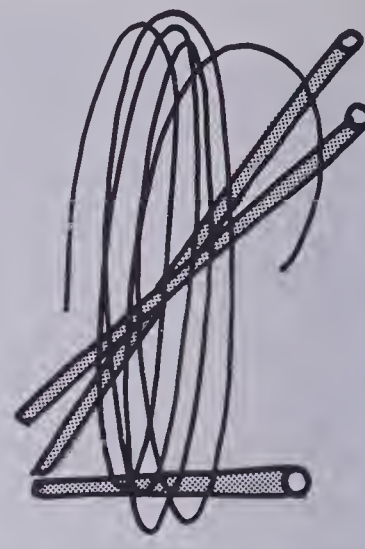
The diameter of a wire is 0.05 cm.

The diameter of a metal rod is 2.75 cm.

How many times thicker is the rod than the wire?

$$0.05 \overline{)2.75} = \frac{2.75}{0.05} \rightarrow \frac{2.75 \times 100}{0.05 \times 100} = \frac{275}{5} \rightarrow 5 \overline{)275} \quad \begin{array}{r} 55 \\ 5 \overline{)275} \\ \underline{25} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

The rod is 55 times as thick as the wire.



## Exercises

Divide.

1.  $0.05 \overline{)6.25}$

2.  $0.08 \overline{)5.76}$

3.  $0.07 \overline{)1.61}$

4.  $0.04 \overline{)1.48}$

5.  $0.09 \overline{)5.67}$

6.  $0.02 \overline{)1.92}$

7.  $0.03 \overline{)2.94}$

8.  $0.05 \overline{)3.25}$

9.  $25.8 \div 0.06$

10.  $68.6 \div 0.07$

11.  $42.3 \div 0.09$

12.  $36.5 \div 0.05$

13.  $32.4 \div 0.04$

14.  $79.2 \div 0.08$

15.  $17.1 \div 0.03$

16.  $78.3 \div 0.09$

17.  $0.26 \overline{)2.34}$

18.  $0.15 \overline{)1.05}$

19.  $0.72 \overline{)1.44}$

20.  $0.68 \overline{)5.44}$

21.  $0.73 \overline{)3.65}$

22.  $0.92 \overline{)5.52}$

23.  $0.67 \overline{)4.02}$

24.  $0.28 \overline{)2.52}$

Find the quotient.

25.  $0.14 \overline{)29.4}$

26.  $0.25 \overline{)12.5}$

27.  $0.47 \overline{)23.5}$

28.  $0.56 \overline{)19.6}$

29.  $0.51 \overline{)35.7}$

30.  $0.48 \overline{)38.4}$

31.  $0.95 \overline{)28.5}$

32.  $0.31 \overline{)27.9}$

33.  $0.23 \overline{)10.35}$

34.  $0.76 \overline{)71.44}$

35.  $0.61 \overline{)51.85}$

36.  $0.79 \overline{)45.82}$

★ 37.  $0.68 \overline{)21.828}$

★ 38.  $0.45 \overline{)28.935}$

39.  $0.12 \overline{)11.352}$

40.  $0.38 \overline{)34.542}$

41. A metal beam is 0.54 cm thick.

A second beam is 8.91 cm thick.

How many times thicker is the second beam than the first?



# Measuring

Using a trundle wheel, Peter measured 1 km.

Andrew measured 0.001 km with a ruler.

How many times greater is Peter's measurement than Andrew's?

$$0.001 \overline{)1} = \frac{1}{0.001}$$

Write an equivalent fraction with a whole number as a denominator:

$$\frac{1 \times 1000}{0.001 \times 1000} = \frac{1000}{1} = 1000$$

Short cut:

$$0.001 \overline{)1.000} \rightarrow 1 \overline{)1000}$$



Peter's measurement is 1000 times greater than Andrew's.

## Exercises

Divide.

1.  $0.001 \overline{)7}$

2.  $0.001 \overline{)9}$

3.  $0.001 \overline{)16}$

4.  $0.001 \overline{)25}$

5.  $0.001 \overline{)634}$

6.  $0.001 \overline{)483}$

7.  $0.001 \overline{)500}$

8.  $0.001 \overline{)6438}$

9.  $0.771 \div 0.001$

10.  $0.892 \div 0.001$

11.  $0.406 \div 0.001$

12.  $0.517 \div 0.001$

13.  $0.602 \div 0.001$

14.  $0.953 \div 0.001$

15.  $0.001 \overline{)8.27}$

16.  $0.001 \overline{)3.14}$

17.  $0.001 \overline{)19.28}$

18.  $0.001 \overline{)38.45}$

19.  $0.001 \overline{)634.74}$

20.  $0.001 \overline{)900.17}$

Find the quotient.

★ 21.  $24.5 \div 0.007$

★ 22.  $36.4 \div 0.008$

★ 23.  $3.075 \div 0.123$

★ 24.  $1.587 \div 0.345$

★ 25.  $7.290 \div 0.675$

★ 26.  $608.235 \div 17.63$

27. Sergio's paper plane flew 0.615 m.

Nancy's plane flew 9.225 m.

How many times farther did Nancy's plane fly than Sergio's?



# Equations

A very long game of monopoly lasted 120 h.  
How many days is that?

$$120 \div 24 = n$$
$$5 = n$$

A number sentence with an equals sign is called an **equation**.

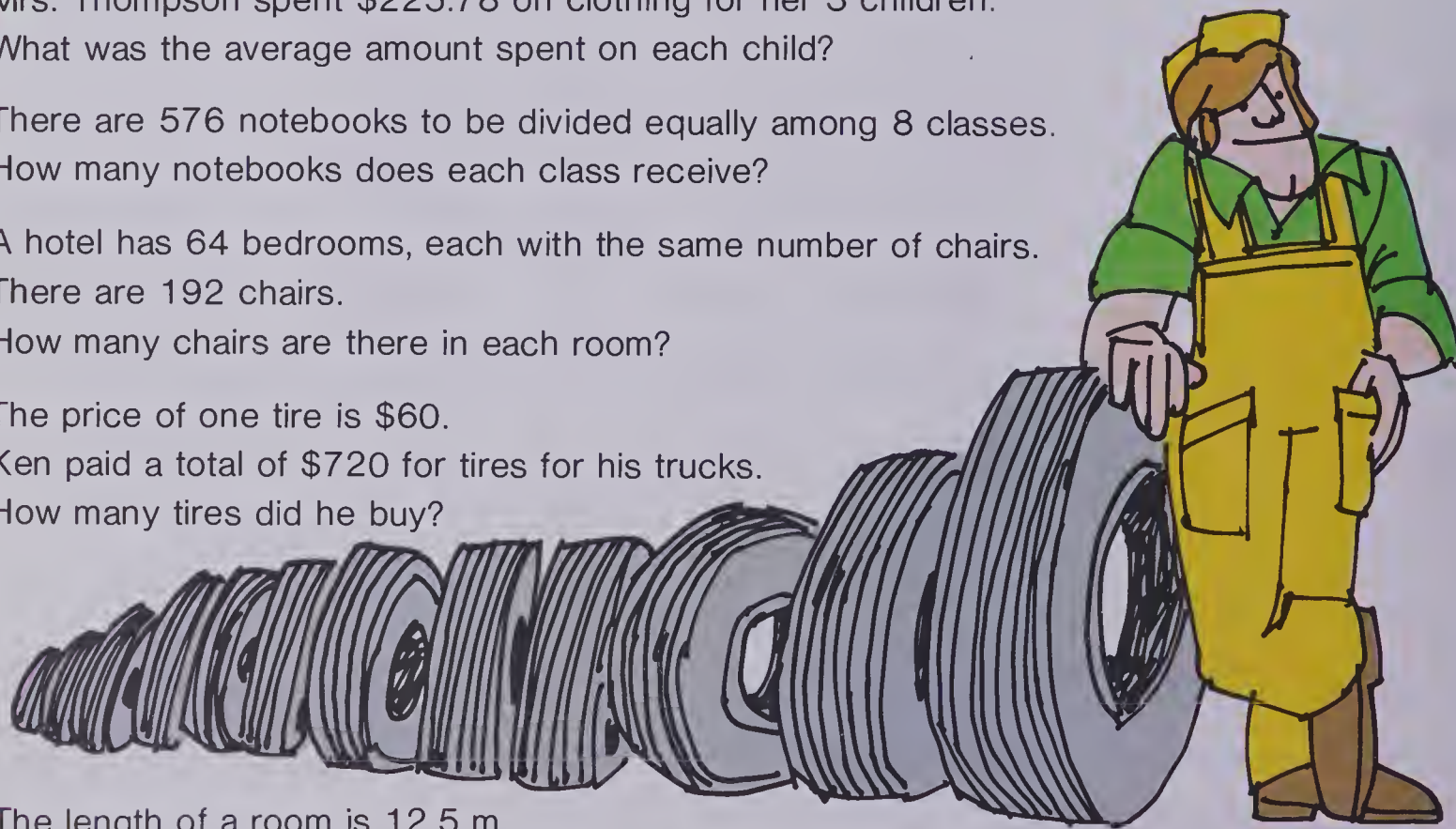
The game lasted 5 d.



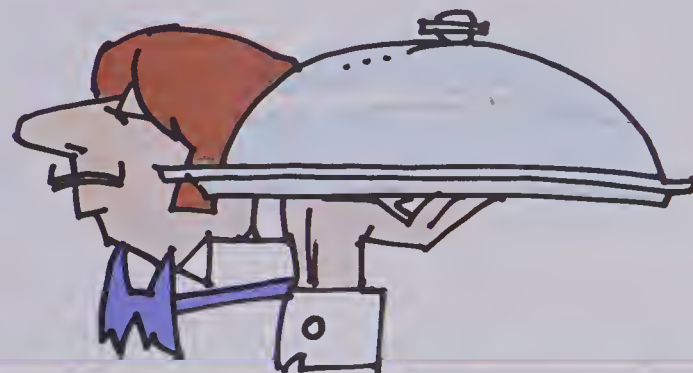
## Exercises

Write equations for the following, and solve.

1. Mrs. Thompson spent \$225.78 on clothing for her 3 children.  
What was the average amount spent on each child?
2. There are 576 notebooks to be divided equally among 8 classes.  
How many notebooks does each class receive?
3. A hotel has 64 bedrooms, each with the same number of chairs.  
There are 192 chairs.  
How many chairs are there in each room?
4. The price of one tire is \$60.  
Ken paid a total of \$720 for tires for his trucks.  
How many tires did he buy?
5. The length of a room is 12.5 m.  
The width of the room is 0.7 times the length.  
What is the width?



6. Mrs. Miller paid \$2.88 for 2 dozen cookies.  
What is the cost of 1 cookie?
7. John is reading an adventure story.  
The book has 243 pages.  
He is  $\frac{1}{3}$  of the way through.  
How many pages has he read?
- ★ 8. The perimeter of a square is 20.92 cm.  
What is the length of each side?
- ★ 9. If 27 ribbons have a total length of 48.6 m, what is the length of 1 ribbon?  
What is the length of 17 ribbons?
- ★ 10. A box of cereal contains 432 g.  
It costs 72¢.  
How many cents does 1 g cost?
11. A caterer charges \$6.75 per meal.  
His bill for his customer was \$4131.  
How many meals did he serve?



## BRAINTICKLER

The Rexford Roughriders football team scored a total of 53 points.  
The number of converted touchdowns was one less than the number of field goals.  
How many converted touchdowns were scored?

*Hint:* 1 field goal = 3 points.

1 converted touchdown = 7 points.





# Estimating

Estimating helps us know if our answer is reasonable.

One barbecued chicken costs \$2.99.

How much will 19 chickens cost?

*Step 1* Round \$2.99 to the nearest dollar amount → **\$3.00**.

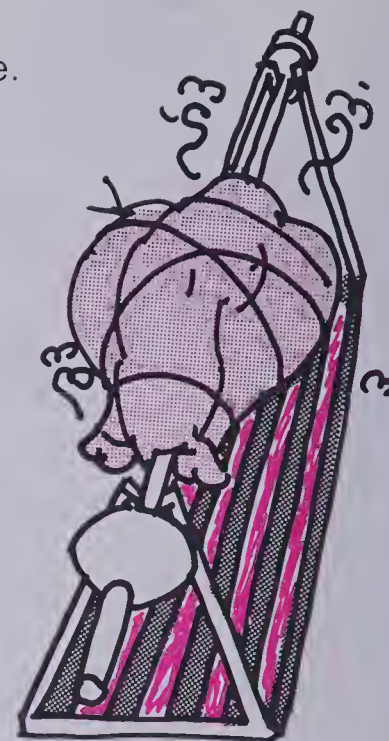
*Step 2* Round 19 chickens to the nearest 10 → **20**.

*Step 3* Estimate →  **$\$3.00 \times 20 = \$60.00$** .  
The chickens will cost **about** \$60.00.

*Step 4* Find the exact amount:  **$\$2.99 \times 19 = \$56.81$** .

*Step 5* Compare: \$56.81 is close to \$60.00.  
Yes, \$56.81 for 19 chickens is reasonable.

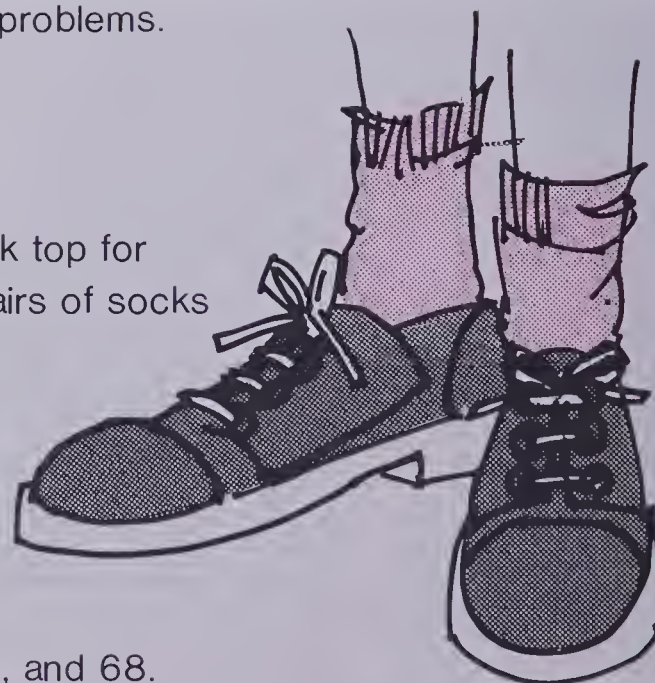
$$\begin{array}{r} \$ 2.99 \\ \times \quad 19 \\ \hline 2691 \\ 2990 \\ \hline \$56.81 \end{array}$$



## Exercises

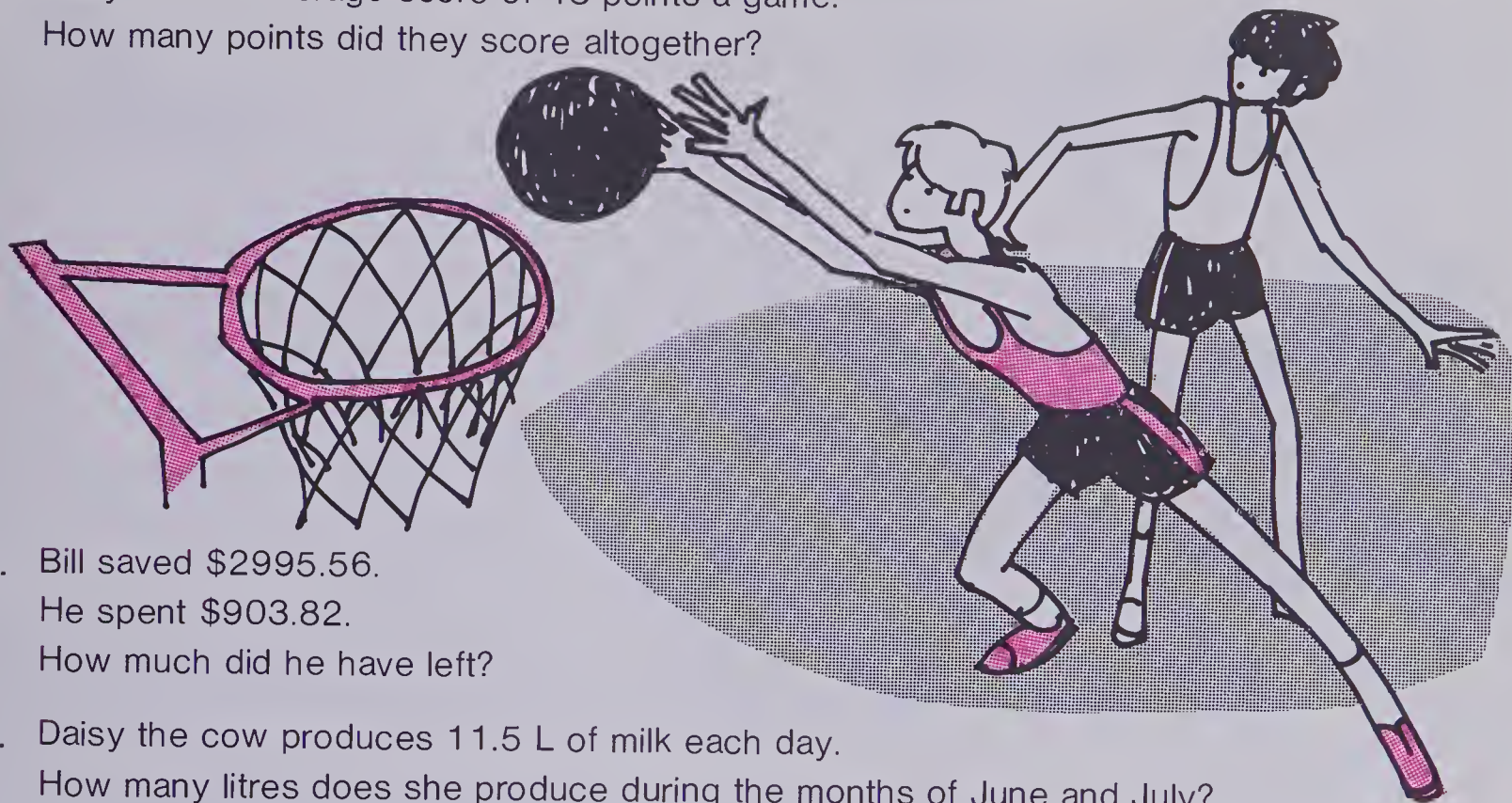
Estimate by rounding, and then solve the following word problems.

1. Bob's new shoes cost \$33.95.  
How much change did he receive from \$40.00?
2. Mrs. West went shopping. She bought one turtleneck top for \$14.99, one pair of corduroy pants for \$17.87, 2 pairs of socks for \$3.88, and a winter jacket for \$34.77.  
How much did she pay altogether?
3. John drives his car 140 km to work each day.  
How far does he travel in 29 d.
4. Mary's math test results last month were 84, 79, 89, and 68.  
What was her average mathematics mark?





5. The school basketball team played 9 games.  
They had an average score of 43 points a game.  
How many points did they score altogether?



6. Bill saved \$2995.56.  
He spent \$903.82.  
How much did he have left?
7. Daisy the cow produces 11.5 L of milk each day.  
How many litres does she produce during the months of June and July?
8. A building has 19 stories. Each story is 3.9 m high.  
What is the total height of the 19 stories?
9. 54 people paid a total of \$99 900.00 to go on a cruise.  
How much did each person pay?



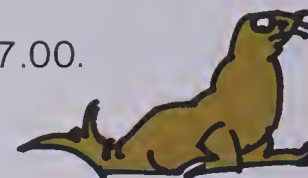
- ★10. During a snowstorm, 100.8 cm of snow fell between 04:30 and 15:00 on the same day.  
On the average, how many centimetres of snow fell each hour?

# Sea Aquarium

On Thanksgiving Monday, the Sea Aquarium ticket office collected \$11 737.00.

The price of 1 ticket was \$2.75.

How many people bought tickets?



$$\begin{array}{r} 4\ 268 \\ \$11\ 737.00 \div \$2.75 = 275 \overline{)1\ 173\ 700} \end{array}$$

$$\begin{array}{r} 1\ 100 \\ \hline 73\ 7 \\ 55\ 0 \\ \hline 18\ 70 \\ 16\ 50 \\ \hline 2\ 200 \\ 2\ 200 \\ \hline \end{array}$$

Check by estimating:

Round — then divide

$$\$11\ 737.00 \div \$2.75$$

$$12\ 000 \div 3 = 4000$$

Compare to actual answer.

\$4268 is close to \$4000.

It checks!

4268 people bought tickets.

## Exercises

Copy and complete.

- |                                  |                               |                               |                               |
|----------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 1. (a) $7 \overline{)37\ 436}$   | (b) $4 \overline{)30\ 120}$   | (c) $9 \overline{)48\ 976}$   | (d) $5 \overline{)26\ 804}$   |
| 2. (a) $30 \overline{)37\ 284}$  | (b) $80 \overline{)16\ 493}$  | (c) $60 \overline{)37\ 248}$  | (d) $90 \overline{)448\ 377}$ |
| 3. (a) $36 \overline{)403\ 618}$ | (b) $21 \overline{)674\ 618}$ | (c) $92 \overline{)678\ 324}$ | (d) $83 \overline{)58\ 924}$  |
| 4. (a) $5 \overline{)34.945}$    | (b) $4 \overline{)11.412}$    | (c) $9 \overline{)5.9814}$    | (d) $2 \overline{)0.0352}$    |
| 5. (a) $3.7 \overline{)0.4625}$  | (b) $0.83 \overline{)4.7144}$ | (c) $7.8 \overline{)22.3938}$ | (d) $6.2 \overline{)40.8642}$ |

Find the quotient. Check by estimating.

- |                            |                          |                          |
|----------------------------|--------------------------|--------------------------|
| 6. (a) $81.1195 \div 3.43$ | (b) $289.3026 \div 6.78$ | (c) $11.4276 \div 0.321$ |
| (d) $20.0583 \div 4.37$    | (e) $48.8130 \div 7.95$  | (f) $53.9679 \div 6.51$  |

7. On Tuesday, the Sea Aquarium ticket office collected \$6960.25.

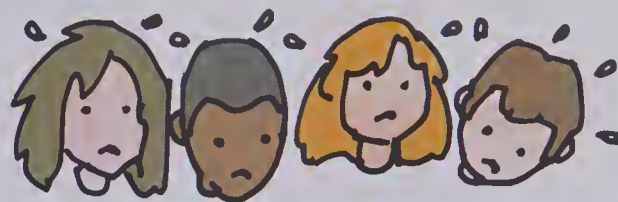
The price of 1 ticket was \$2.75.

How many people bought tickets?



# Community Picnic

4 children tied for first place in a race.  
The first-place prize was \$3.  
The prize was divided equally among the winners.  
How much did each child receive?



Divide the whole number.

$$\begin{array}{r} 0 \\ 4 \overline{) 3} \end{array}$$

Place decimal point.  
Annex a zero.

$$\begin{array}{r} 0. \\ 4 \overline{) 3.0} \end{array}$$

Divide the tenths.

$$\begin{array}{r} 0.7 \\ 4 \overline{) 3.0} \\ \underline{28} \\ 2 \end{array}$$

Annex another zero.

$$\begin{array}{r} 0.7 \\ 4 \overline{) 3.00} \\ \underline{28} \\ 2 \end{array}$$

Divide the hundredths.

$$\begin{array}{r} 0.75 \\ 4 \overline{) 3.00} \\ \underline{28} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

Each winner received \$0.75 or 75¢.

## Exercises

Divide until you have a remainder of 0.  
You may need to annex 3 zeros in some questions.

1.  $4 \overline{) 1}$

2.  $8 \overline{) 6}$

3.  $8 \overline{) 2}$

4.  $12 \overline{) 9}$

5.  $12 \overline{) 3}$

6.  $16 \overline{) 5.28}$

7.  $14 \overline{) 3.5}$

8.  $14 \overline{) 3.36}$

9.  $36 \overline{) 12.6}$

10.  $96 \overline{) 24}$

11.  $8 \overline{) 1}$

12.  $8 \overline{) 3}$

13.  $16 \overline{) 2}$

14.  $16 \overline{) 6}$

15.  $24 \overline{) 3}$

16.  $32 \overline{) 4}$

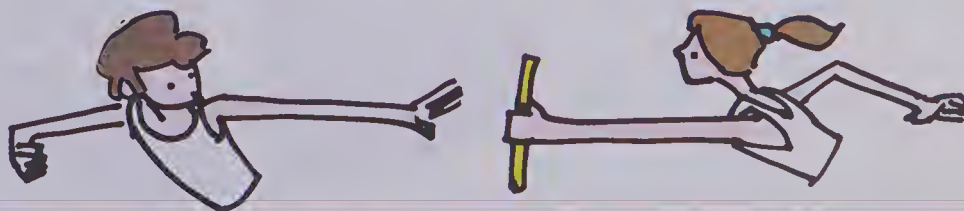
17.  $32 \overline{) 12}$

18.  $32 \overline{) 28}$

19.  $96 \overline{) 12}$

20.  $128 \overline{) 80}$

21. Four runners ran a relay.  
Each ran the same distance.  
The total distance was 1 km.  
How far did each run?





# Flip-a-Penny Math

1. Make up the game board on graph paper.
2. Four people can play.
3. The first player declares the math operation for the first round (addition, subtraction, multiplication, or division).
4. The first player flips 2 pennies, one after the other.
5. If the operation is addition, the first player adds his two numbers.
6. The second player does the same, and so on, until all players have had a chance. The player with the highest number wins a point.
7. The winner starts the next game.

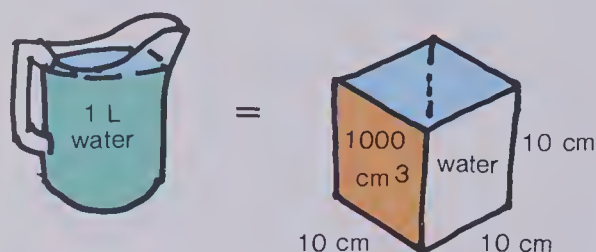
**NOTE:** If the penny touches more than 1 square, move it to the square with the greatest number value.

8. All players should do the operations as a check for each other.
9. Keep a total of all points to find the overall winner.



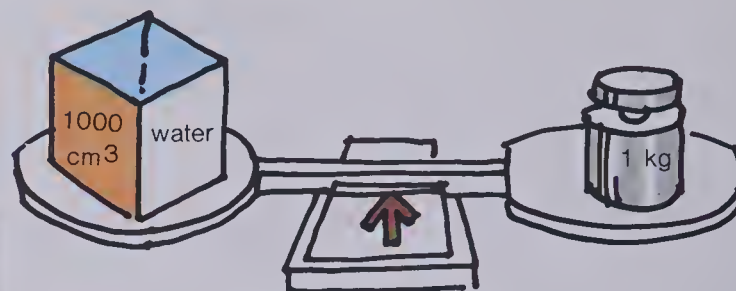
0	96	79	10	53	61
86	99	45	83	27	44
28	7	72	18	60	15
51	62	37	50	1	65
87	29	5	56	33	14
17	70	97	21	66	32

# Capacity - Mass - Volume



1 L of water occupies 1000 cm<sup>3</sup>.

1 L → 1000 cm<sup>3</sup>



1 L of water has a mass of 1 kg.

1 L → 1 kg

## Activity

1. (a) Use a container that will hold a litre of water.  
Place it on the balance and find the mass of the container.

- (b) Pour into the container exactly 1 L of water.  
Balance to find the mass of the container with the water in it.

- (c) Subtract to find the mass of 1 L of water.

1 L = ■ kg

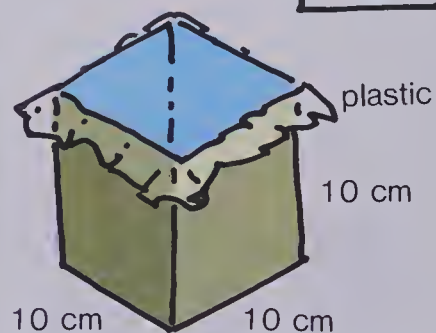
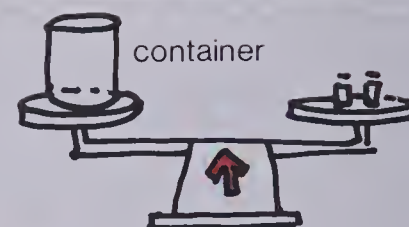
2. (a) Make a container 10 cm × 10 cm × 10 cm.

- (b) Place plastic inside it to make it waterproof.

- (c) Pour in exactly 1 L of water.

- (d) Copy and complete:

1 L = ■ cm<sup>3</sup>



## Exercises

Copy and complete.

1. The mass of 1 L of water is ■ kg.
2. 1000 cm<sup>3</sup> of water has a mass of ■ kg.
3. 1 L of water fills ■ cm<sup>3</sup>.





4. What is the mass of each quantity of water?

- (a) 1000 cm<sup>3</sup> (b) 500 cm<sup>3</sup> (c) 2 L (d) 0.5 L (e) 3.5 L

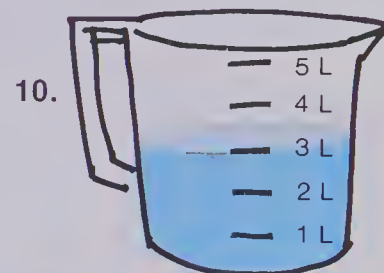
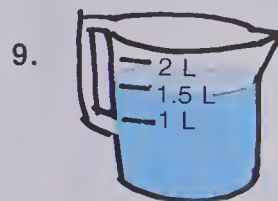
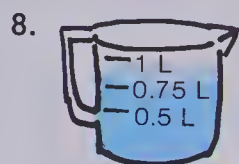
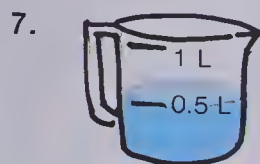
5. What is the measure in cubic centimetres of each quantity of water?

- (a) 1 kg (b) 3 kg (c) 0.5 kg (d) 2.5 kg (e) 1000 g

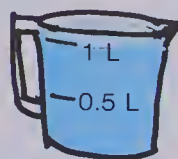
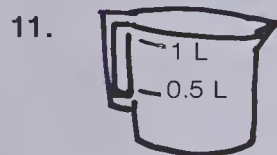
6. What is the measure in litres of each quantity of water?

- (a) 2 kg (b) 0.5 kg (c) 2000 cm<sup>3</sup> (d) 500 cm<sup>3</sup> (e) 1500 cm<sup>3</sup>

What is the mass of water in each container?

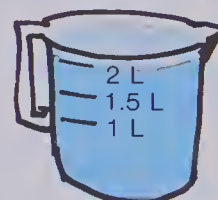
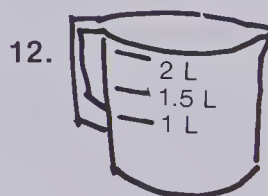


Find the total mass.



Container only  
750 g

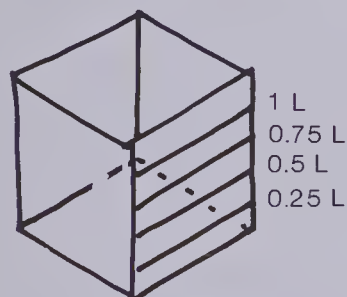
Full of water  
Total mass?



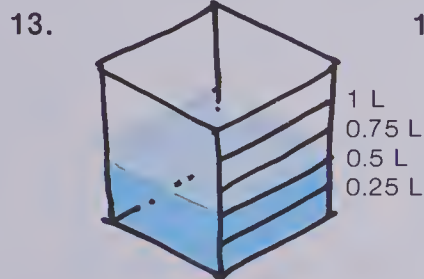
Container only  
1.2 kg

Full of water  
Total mass?

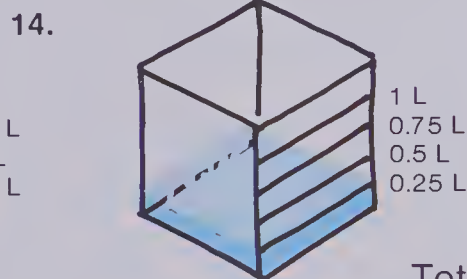
What is the total mass of each container filled with water to the level shown?



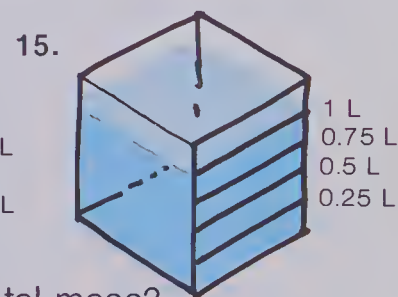
Container only  
600 g



Total mass?

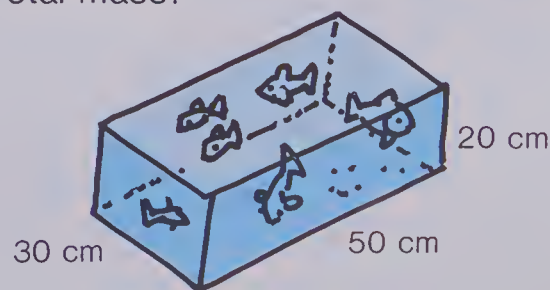


Total mass?



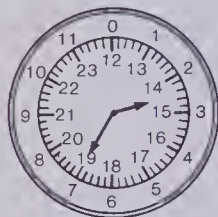
Total mass?

- ★16. Calculate the (a) volume, (b) mass, and (c) number of litres of water in this aquarium.

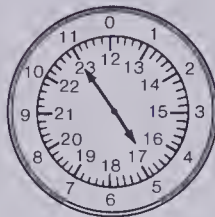


# Time After Time

How many hours and minutes between



and



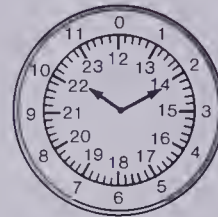
?

02:35 to 03:35 → 1 h  
 03:35 to 04:35 → 1 h  
 04:35 to 04:55 → 20 min  


---

 02:35 to 04:55 is 2 h 20 min

Write the time 3 h and 20 min  
after



Time is:

01:30

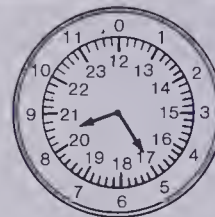
the next day.

22:10

22:10 → 23:10 → 24:10 → 00:10 → 01:10 → 01:30  
 1 h      1 h      1 h      20 min

## Exercises

- Write the time shown on the clock.  
Can you tell whether it is morning or evening? Why?



- Tell whether each time is before noon or after noon.

(a) 04:23

(b) 16:23

(c) 11:07

(d) 20:48

- How many hours from A to B?

A	04:25	08:20	20:00	15:15
B	07:25	16:20	03:00	02:15

- How many hours and minutes from A to B?

A	02:30	11:20	10:35	02:48
B	03:45	12:30	14:40	05:13

- Write the time.

(a) 3 h after 08:03

(c) 7 h after 16:05

(e) 4 h after 20:25

(g) 1 h 20 min after 08:10

(b) 5 h after 14:55

(d) 2 h after 23:15

(f) 3 h after 19:00

(h) 3 h 40 min after 22:45

- Mark's family left home by car at 10:10.  
They arrived at Aunt Millie's 6 h 20 min later.  
What time did they arrive?

- ★ Father drove for 8 h 20 min.  
He arrived home at 06:30.  
When did he leave?

# Time Zones



## Exercises

Count the time zones to help you do these.

1. Tell how many hours difference in time between the following:

- |                                  |                                    |
|----------------------------------|------------------------------------|
| (a) Edmonton and London, England | (b) Toronto and London, England    |
| (c) Dawson and Charlottetown     | (d) Whitehorse and St. John's      |
| (e) Regina and London, England   | (f) Vancouver and London, England. |

2. A time is given in each city. Write the time in the second city.

- |   |   |
|---|---|
| (a) 21:00 in Edmonton; Toronto                | (b) 09:00 in Whitehorse; Gander, Newfoundland |
| (c) 12:00 in London, England; London, Ontario | ★ (d) 12:00 in St. John's; Winnipeg           |
| ★ (e) 05:15 in Calgary; Ottawa                | (f) 08:35 in Halifax; London, England         |
| ★ (g) 08:50 in Winnipeg; Vancouver            | ★ (h) 10:20 in Saskatoon; Moncton             |
| ★ (i) 22:40 in Lethbridge; London, England    | (j) 18:35 in Vancouver; London, England       |

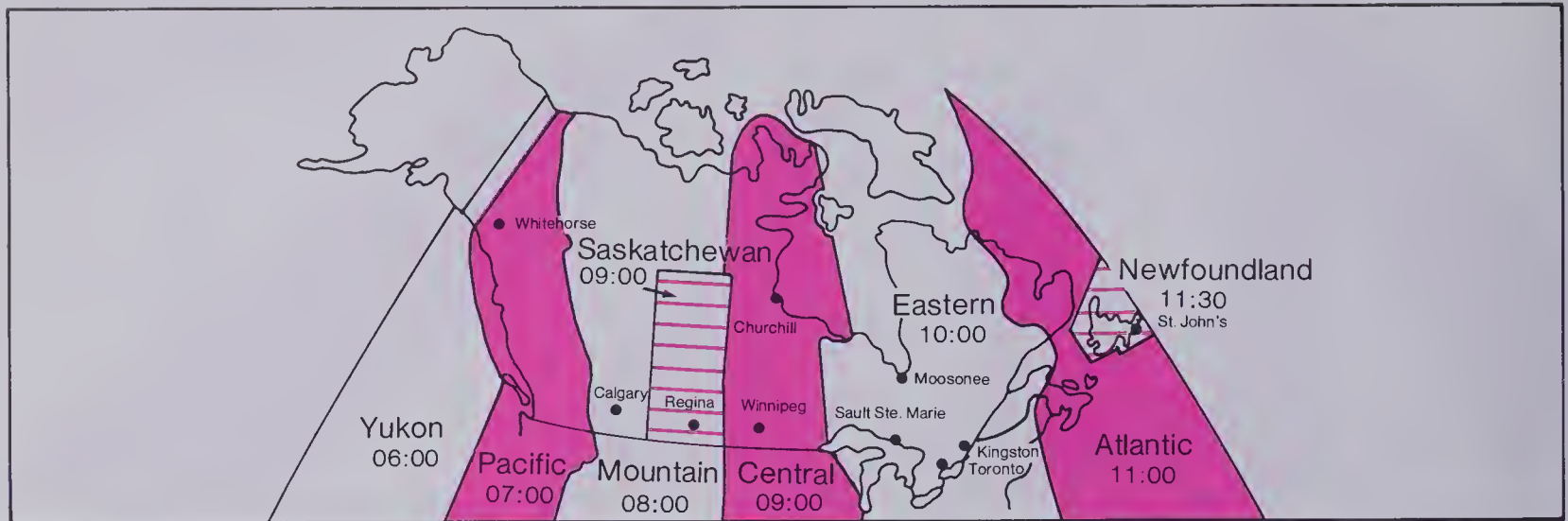
- ★ 3. Jill left Vancouver at 08:00 on an Air Canada flight.  
Flying time to Toronto is 5 h.  
What is the time in Toronto when she arrives?

- ★ 4. Martin left Montreal at 09:30 on a Canadian Pacific flight.  
Flying time to Winnipeg is 4 h.  
What is the time in Winnipeg when Martin arrives?





# Daylight Saving Time



In order to take maximum advantage of spring and summer sunlight hours, many areas go from standard time to daylight saving time. These areas use this rule:

In the spring: move clocks ahead 1 h. (spring ahead)  
 In the fall: move clocks back 1 h. (fall back)

The exact dates of the changes vary each year.

## Exercises

- Marcey lives in Sault Ste. Marie.  
In the spring she decided to set her watch for daylight saving time.  
Her watch showed 20:15.  
What should she set her watch to?
- Luke lives in Kingston, Ontario.  
In the fall he decided to set his watch to go off daylight saving time.  
His watch showed 07:30.  
What should he set his watch to?
- One of the provinces does not go on daylight saving time.  
Which province is it?
- The change in time is usually made at 02:00.  
Do you gain or lose an hour of sleep in  
(a) the spring? (b) the fall?
- Use daylight saving time.  
When it is 22:10 in Regina, what time is it in:  
(a) Calgary? (b) Winnipeg? (c) St. John's? (d) Toronto? (e) Whitehorse?

# Centuries

A century is 100 years.

We number the centuries as shown.



The year 140 is in the 2nd century.

The year 276 is in the 3rd century.

The year 1840 is in the 19th century.

The year 1983 is in the 20th century.

## Exercises

1. Name the century each year is in.

- (a) 76 (b) 103 (c) 267 (d) 1867 (e) 1985 (f) 2208

2. Write the interval of years for each century.

- (a) 1st → 0 - 99 (b) 2nd → 100 - ■ (c) 3rd  
(d) 19th (e) 20th (f) 21st

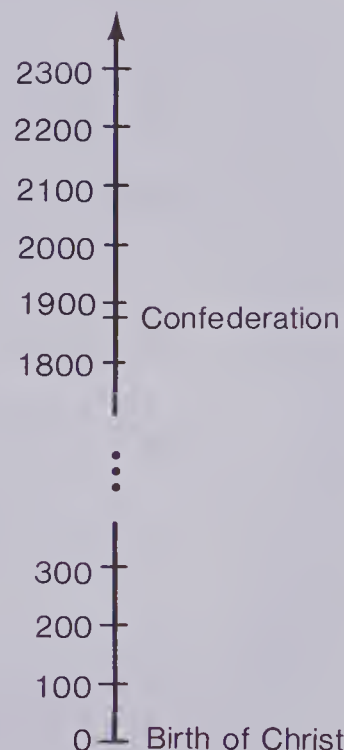
3. Vertically, on your page, draw a segment 23 cm long.

At the bottom mark 0 (for the birth of Christ), and let each centimetre represent 100 years.

Label each 100 years and name the centuries.

Mark and label each event.

- (a) 75 — Heron, Greek Mathematician  
(b) 150 — Ptolemy, an astronomer  
(c) 410 — Hypatia, first woman of mathematics  
(d) 1066 — Norman Conquest  
(e) 1492 — Columbus discovered America  
(f) 1349 — Black Death  
(g) 1431 — Joan of Arc burned at the stake  
(h) 1500 — Leonardo da Vinci  
(j) 1675 — Greenwich Observatory founded  
(l) 1743 — la Verendryes sighted the Rockies  
(n) This year

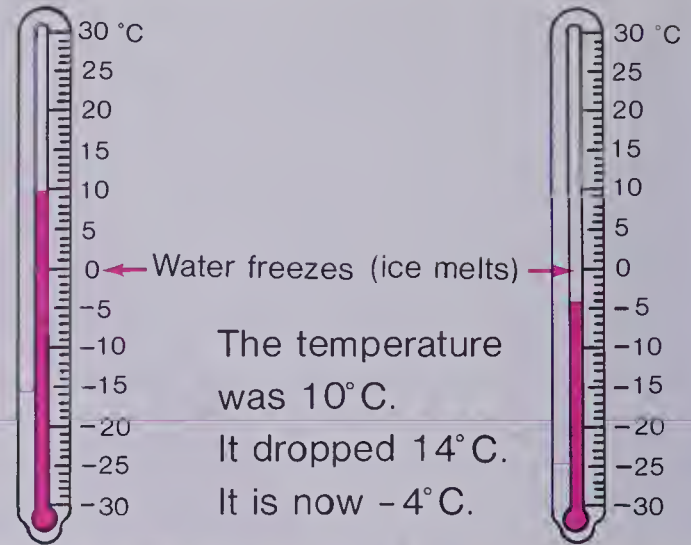


- (i) 1608 — Telescope invented  
(k) 1867 — Confederation  
(m) 1975 — A. Y. Jackson died  
(o) 100 years from this year

# Measuring Temperatures

Temperatures colder than  $0^{\circ}\text{C}$  are identified by a **minus** sign in front of the numbers:  $-10^{\circ}\text{C}$ ,  $-23^{\circ}\text{C}$ .

A temperature reading of  $-4^{\circ}\text{C}$  means the temperature is colder than  $0^{\circ}\text{C}$ , or colder than the temperature at which water freezes.



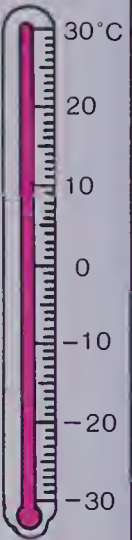
## Exercises

1. What does the minus (-) sign in  $-28^{\circ}\text{C}$  mean?

Use the thermometer scale. Record the new temperatures.

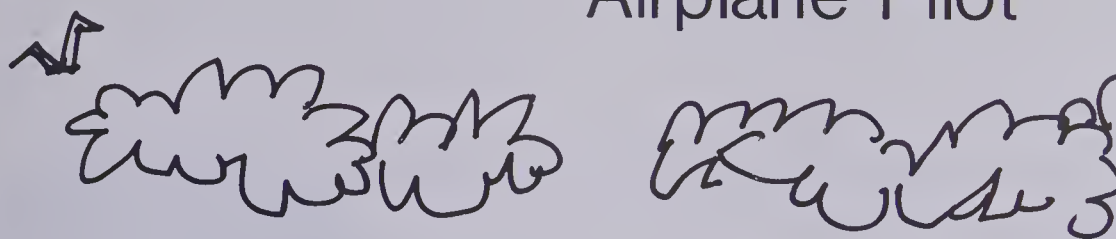
- |   |   |
|---|---|
| 2. It was $15^{\circ}\text{C}$ ; temperature dropped $10^{\circ}\text{C}$ .   | 3. It was $12^{\circ}\text{C}$ ; temperature dropped $12^{\circ}\text{C}$ .                                       |
| 4. It was $8^{\circ}\text{C}$ ; temperature dropped $10^{\circ}\text{C}$ .  | 5. It was $0^{\circ}\text{C}$ ; temperature dropped $15^{\circ}\text{C}$ .  |
| 6. It was $-12^{\circ}\text{C}$ ; temperature dropped $12^{\circ}\text{C}$ .  | 7. It was $-22^{\circ}\text{C}$ ; temperature dropped $8^{\circ}\text{C}$ .                                       |
| 8. It was $4^{\circ}\text{C}$ ; temperature rose $8^{\circ}\text{C}$ .  | 9. It was $0^{\circ}\text{C}$ ; temperature rose $11^{\circ}\text{C}$ .   |
| 10. It was $-5^{\circ}\text{C}$ ; temperature rose $3^{\circ}\text{C}$ .  | 11. It was $-11^{\circ}\text{C}$ ; temperature rose $29^{\circ}\text{C}$ .  |
| 12. It was $-19^{\circ}\text{C}$ ; temperature rose $35^{\circ}\text{C}$ .  | 13. It was $-28^{\circ}\text{C}$ ; temperature rose $19^{\circ}\text{C}$ .  |
| 14. The temperature rose $18^{\circ}\text{C}$ .<br>It is now $23^{\circ}\text{C}$ .<br>What was the original temperature? | 15. The temperature rose $12^{\circ}\text{C}$ .<br>It is now $7^{\circ}\text{C}$ .<br>What was it before it rose? |

- ★ 16. In Canada, the coldest temperature recorded is  $-63^{\circ}\text{C}$  (Yukon).  
The hottest temperature recorded is  $46^{\circ}\text{C}$  (B.C.).  
What is the difference between the hottest and coldest temperatures?





# Airplane Pilot



Use the time-zone maps on pages 147 and 148

1. A pilot is on a flight leaving Toronto for Victoria.  
It departs at 10:15 Toronto time.  
It arrives at 12:45 Victoria time.  
What is the total flight time?
2. An air crew leaves Edmonton at 08:10.  
They arrive in Halifax at 18:45.  
What is the total time of the trip?
3. During daylight saving time of the year, an air crew leaves Winnipeg at 12:30.
  - (a) The flight to Regina is 1 h long.  
What time do they arrive in Regina?
  - (b) The flight to Calgary from Winnipeg is 2 h long.  
What time do they arrive in Calgary?
4. The temperature in Toronto at take-off time is  $28^{\circ}\text{C}$ .  
At 11 000 m the captain announces "The outside temperature is  $-52^{\circ}\text{C}$ ."  
How much lower is this temperature than on the ground?
5. The temperature inside the airplane is a comfortable  $21^{\circ}\text{C}$ .  
Outside, the temperature is  $44^{\circ}\text{C}$  lower.  
What is the outside temperature?
- ★ 6. A flight leaves Toronto for Vancouver at 01:00 Toronto standard time.  
The flight takes 5 h 20 min.  
The plane lands in Vancouver on daylight saving time.  
What time is it when it lands?



# Problems

For each problem, *either* :

- (a) identify what information is *not* required  
or (b) identify what additional information is needed to solve the problem.

Solve any problem that has sufficient information.

1. Rainfall is recorded in millimetres.  
Snowfall is recorded in centimetres.  
1 cm of snow provides the same moisture as 1 mm of rain.  
It rained 14 mm on June 3, 1978.  
How many millimetres of rain is the same as 9 cm of snow?
2. The length of a room is 4 m.  
Mark paid \$16.95 for each square metre of rug.  
How much did the rug cost for the room?
3. The tallest mountain in Canada is Mt. Logan in the Yukon.  
It is 6050 m tall.  
How much taller is Mt. Logan than Mt. Robson?  
Mt. Robson is in B.C.
4. The greatest recorded snowfall in Canada was at Kemano in B.C.  
It snowed 2235 cm.  
The average snowfall in Vancouver is 62.3 cm.  
The average rainfall is 1432 mm.  
How much more snow fell in Kemano than is the average in Vancouver?
5. The area of Mrs. Burns' field is 730 ha.  
The length of Mr. Snow's field is 80 hm.  
How many more hectares are in Mr. Snow's field than in Mrs. Burns' field?



## BRAINTICKLER

Professor Q was very tired. He went to bed at 9:00 p.m.  
"I'll sleep till noon tomorrow!" he said, and he set his alarm.  
How many hours did he sleep? (15 h is incorrect!)





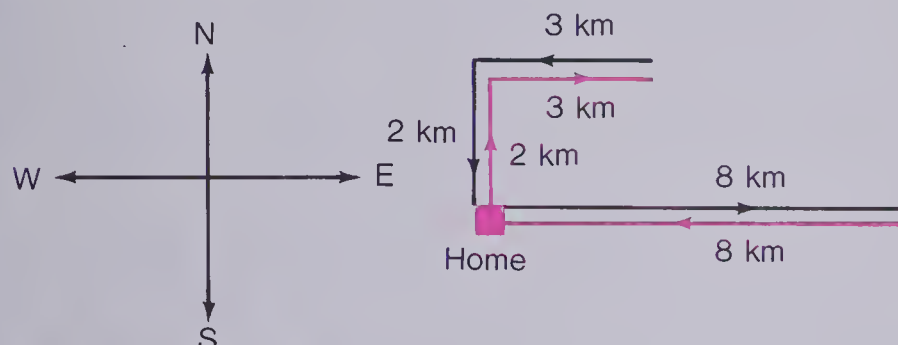
# Drawing Pictures to Help Solve Word Problems

Mark rode his bicycle 8 km east.

He returned home.

Then he rode 2 km north, then 3 km east, and he returned the same way.

How far did he ride?



He rode:  $8 \text{ km} + 8 \text{ km} + 2 \text{ km} + 3 \text{ km} + 3 \text{ km} + 2 \text{ km}$ .

He rode 26 km.



## Exercises

Draw a picture for each problem. Solve.

1. Mark rode his bicycle 2.3 km west, then 4.5 km south.

He returned the same way.

Then he rode 3.4 km north, 2.3 km east, and back the same way.

How far did he ride?

2. A garden is rectangular.

It is  $100 \text{ m} \times 500 \text{ m}$ .

A square is marked out of one corner for a lawn.

This square is  $50 \text{ m} \times 50 \text{ m}$ .

How much fencing is needed to fence the garden?

(No fence is required where the lawn is.)

3. A spacecraft blasts off for Mars.

It circles Mars 3 times, then returns to Earth.

The distance to Mars is 209 215 000 km.

One orbit of Mars is 14 000 km.

How far did the spacecraft travel?

4. A taxi costs \$0.80 for any trip up to 1 km, then \$0.50 for each kilometre after.

How much does a trip of 4 km cost?

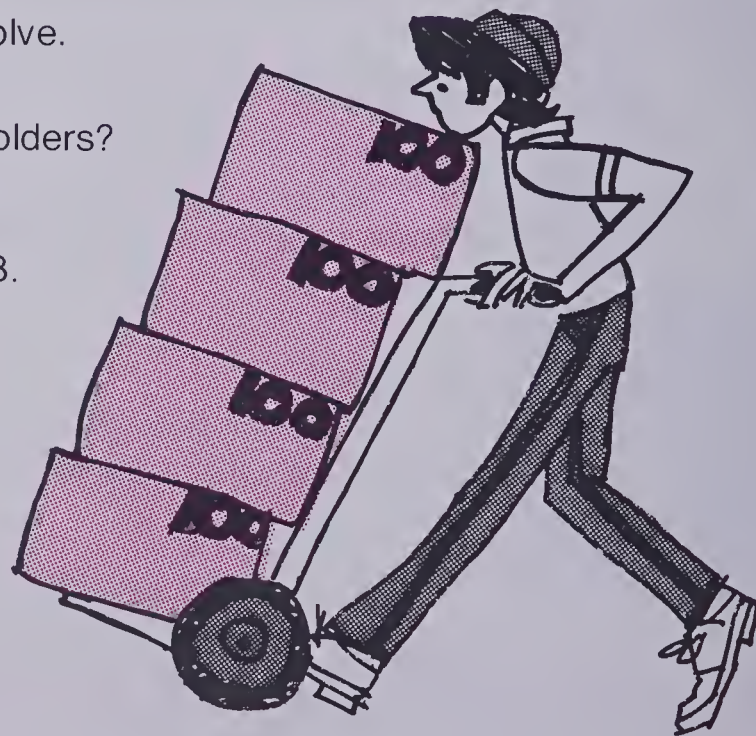




# Chapter Test

Divide.

1. (a)  $0.1 \overline{)1479}$  (b)  $0.1 \overline{)732.4}$  (c)  $0.8 \overline{)5224}$  (d)  $0.6 \overline{)17.64}$
2. (a)  $3.4 \overline{)272}$  (b)  $6.8 \overline{)408}$  (c)  $4.7 \overline{)1739}$  (d)  $9.6 \overline{)6144}$
3. (a)  $17 \div 0.01$  (b)  $16.347 \div 0.01$  (c)  $7658 \div 0.001$  (d)  $0.583 \div 0.001$
4. (a)  $0.27 \overline{)918}$  (b)  $0.61 \overline{)28.67}$  (c)  $3.8 \overline{)19.76}$  (d)  $6.4 \overline{)54.464}$
5. (a)  $15.3552 \div 3.36$  (b)  $286.728 \div 5.2$  (c)  $10.1232 \div 1.48$
6. (a)  $4 \overline{)3}$  (b)  $50 \overline{)45}$  (c)  $0.681 \overline{)50.394}$  (d)  $26.9 \overline{)63.484}$
7. Write an equation for the following, and then solve.  
There are 100 file folders in 1 box.  
How many boxes are needed for 35 000 file folders?
8. Estimate by rounding, and then solve.  
The cost per student for a class trip was \$4.88.  
The total amount collected was \$180.56.  
How many students were in the class?
9. The mass of 1 L of water is ■ kg.
10. The volume of 1 L of water is ■ cm<sup>3</sup>.
11. How much time from 08:35 to 14:50?
12. What is the time 3 h 10 min after 12:50?
13. The temperature was  $-3^{\circ}\text{C}$ . It is now  $17^{\circ}\text{C}$ . How many degrees warmer is it now?
14. The temperature was  $-23^{\circ}\text{C}$ . It rose  $32^{\circ}\text{C}$ . What is the temperature now?
15. In which century is the year 1983?



# Cumulative Review

1. Add.

9734	9476	\$ 347.95	0.625
768	3501	24.06	0.761
2973	224	685.19	0.448
+ 501	+ 7198	+ 44.74	+ 0.006

2. Subtract.

85 465	\$5965.42	80 000	0.488
- 21 627	- 610.76	- 4 276	- 0.109

3. Multiply.

$$3.9 \times 0.7$$

$$438 \times 765$$

$$4.58 \times \$8.61$$

$$90 \times 4732$$

4. Divide.

$$0.1 \overline{)0.841}$$

$$4.7 \overline{)1739}$$

$$0.17 \overline{)44.88}$$

$$5.1 \overline{)40.392}$$

5. Round according to instructions.

9128 (nearest ten)

68 543 (nearest thousand)

751 245 (nearest hundred)

6. Write in words.

6427

468 452

3 649 067

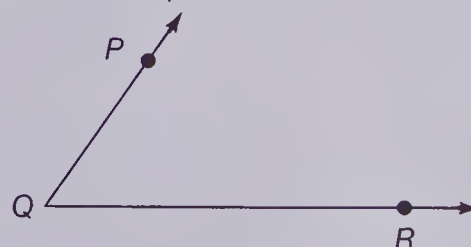
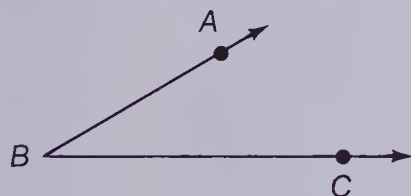
7. Copy and complete.

$$68 \times 42 = n \times 68$$

$$7 \times n = 70$$

$$1000 \times 63 = n$$

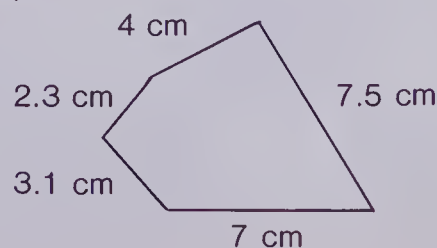
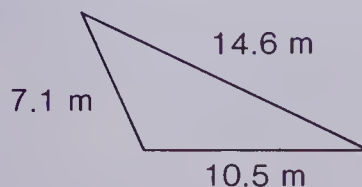
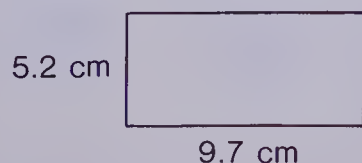
8. Use your protractor. Are  $\angle ABC$  and  $\angle PQR$  congruent? Explain.



9. Draw a straight angle and label it  $\angle RST$ .

10. Draw an obtuse angle and label it  $\angle PQR$ . Measure  $\angle PQR$ .

11. Calculate the perimeter.





# Chapter 6

# Number Theory

Divisibility

Factors and Multiples

Primes and Composites

Exponents





# Making Rectangles

These rectangles can be made by using 12 squares.

Multiplication fact

Division facts



$$1 \times 12 = 12$$

$$12 \div 12 = 1$$

$$12 \div 1 = 12$$



$$2 \times 6 = 12$$

$$12 \div 6 = 2$$

$$12 \div 2 = 6$$



$$3 \times 4 = 12$$

$$12 \div 4 = 3$$

$$12 \div 3 = 4$$



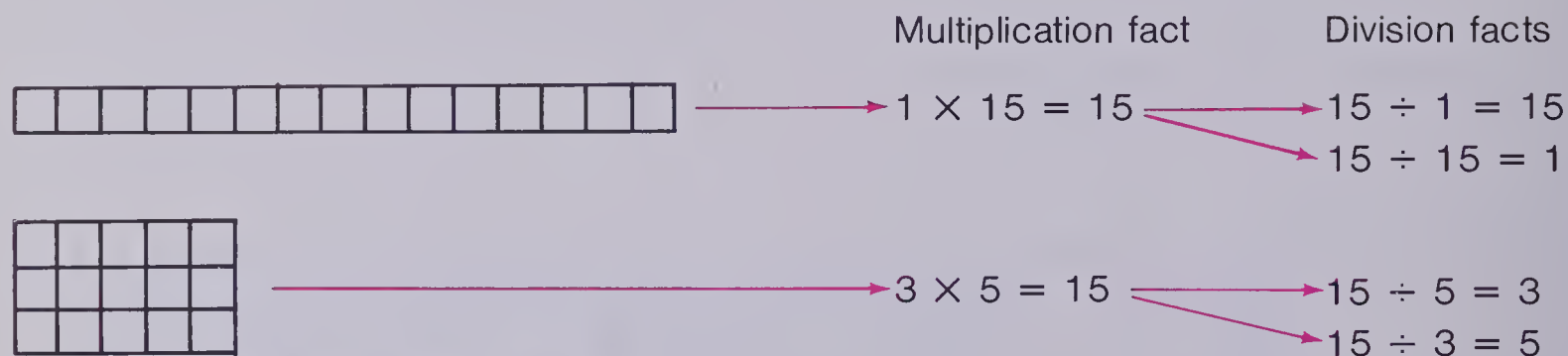
## Exercises

1. (a) Draw all the possible rectangles using 20 squares.  
 (b) Write the multiplication fact for each rectangle.  
 (c) Write 2 related division facts for each multiplication statement.
2. Write all the possible multiplication facts for rectangles made from these sets of squares.
 

(a) 24 squares	(b) 30 squares	(c) 32 squares
(d) 36 squares	(e) 50 squares	(f) 56 squares
(g) 72 squares	(h) 96 squares	(i) 100 squares
3. Write two related division facts for each multiplication fact in Exercise 2.

# Rectangles and Divisibility

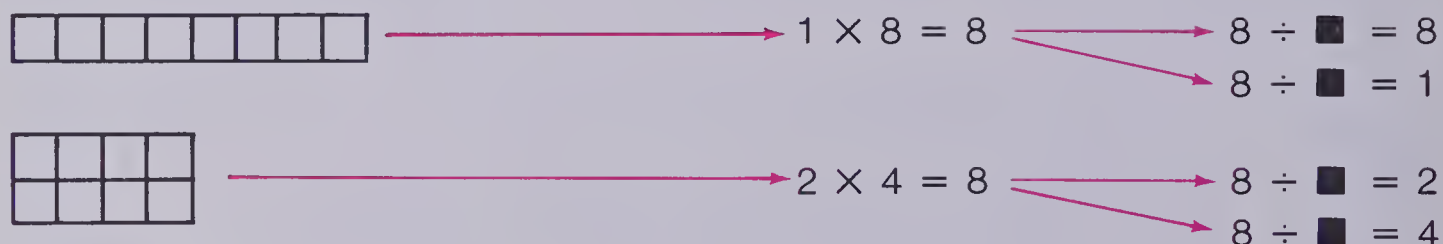
These rectangles can be made by using 15 squares.



15 is divisible by 1, 3, 5, and 15.

## Exercises

1. (a) Draw the possible rectangles by using 8 squares.
- (b) Write multiplication and division facts for each.
- (c) Write a divisibility statement.



8 is divisible by  $\blacksquare$ ,  $\blacksquare$ ,  $\blacksquare$ , and  $\blacksquare$ .

2. Repeat Parts (a), (b), and (c) in Exercise 1 for:

- |                |                 |
|----------------|-----------------|
| (a) 10 squares | (b) 18 squares  |
| (c) 25 squares | (d) 48 squares  |
| (e) 64 squares | (f) 84 squares  |
| (g) 96 squares | (h) 120 squares |

Note: A square is a special rectangle with all 4 sides equal.

# Divisibility

24 is divisible by 2, 3, 4, and 6 but not by 5.

$$\begin{array}{r} 12 \\ 2 \overline{)24} \\ \underline{2} \phantom{0} \\ 04 \\ \underline{4} \\ 0 \end{array}$$

$$\begin{array}{r} 8 \\ 3 \overline{)24} \\ \underline{24} \\ 0 \end{array}$$

$$\begin{array}{r} 6 \\ 4 \overline{)24} \\ \underline{24} \\ 0 \end{array}$$

$$\begin{array}{r} 4 \\ 6 \overline{)24} \\ \underline{24} \\ 0 \end{array}$$

$$\begin{array}{r} 4 \\ 5 \overline{)24} \\ \underline{20} \phantom{0} \\ 4 \end{array}$$

24 is not  
divisible by 5.

A whole number is divisible by a given whole number if it divides without remainder (the remainder is zero).

## Exercises

1. Which of these numbers are divisible by 2?

14      17      20      30      35      62      77

2. How can you recognize numbers that are divisible by 2?

3. Which of these numbers are divisible by 5?

10      27      55      70      96      110

4. How can you recognize numbers that are divisible by 5?

5. Which of these numbers are divisible by 10?

20      75      140      207      330      950

6. How can you recognize numbers that are divisible by 10?

7. Which of these numbers are divisible by 8?

24      54      78      100      136      232

8. Which of these numbers are divisible by 9?

63      82      135      171      216      321

- ★ 9. A whole number that is divisible by 9 has a digit sum of 9 or 18 or 27 or ...

$$72 \rightarrow 7 + 2 = 9$$

72 is divisible by 9.

$$585 \rightarrow 5 + 8 + 5 = 18$$

585 is divisible by 9.

Write 6 three-digit numbers that are divisible by 9. Check by dividing.





# Rules for Divisibility

360 is divisible by 2, 3, 4, 5, 6, 8, 9, and 10.

$\begin{array}{r} 180 \\ 2 \overline{)360} \\ \underline{2} \phantom{00} \\ 16 \phantom{0} \\ \underline{16} \phantom{0} \\ 00 \end{array}$	$\begin{array}{r} 120 \\ 3 \overline{)360} \\ \underline{3} \phantom{00} \\ 06 \phantom{0} \\ \underline{6} \phantom{0} \\ 00 \end{array}$	$\begin{array}{r} 90 \\ 4 \overline{)360} \\ \underline{36} \phantom{0} \\ 00 \end{array}$	$\begin{array}{r} 72 \\ 5 \overline{)360} \\ \underline{35} \phantom{0} \\ 10 \phantom{0} \\ \underline{10} \phantom{0} \\ 0 \end{array}$	$\begin{array}{r} 60 \\ 6 \overline{)360} \\ \underline{36} \phantom{0} \\ 00 \end{array}$	$\begin{array}{r} 45 \\ 8 \overline{)360} \\ \underline{32} \phantom{0} \\ 40 \phantom{0} \\ \underline{40} \phantom{0} \\ 0 \end{array}$	$\begin{array}{r} 40 \\ 9 \overline{)360} \\ \underline{36} \phantom{0} \\ 00 \end{array}$
---	--	--	---	--	---	--

## Rules for Divisibility

A Counting Number is Divisible		Check
By	If	
Two	The number is an even number.	360 is even.
Three	The sum of the digits is divisible by 3.	$3 + 6 + 0 = 9$ $3 \overline{)9}^3$
Four	The last two digits are divisible by 4.	$3 \boxed{60}$ $4 \overline{)60}^{15}$
Five	The unit's digit is 0 or 5.	$36 \boxed{0}$
Six	The number is even and the sum of the digits is divisible by 3.	360 is even. $3 \overline{)9}^3$
Eight	The last three digits are divisible by 8.	$8 \overline{)360}^{45}$
Nine	The sum of the digits is divisible by 9.	$3 + 6 + 0 = 9$ $9 \overline{)9}^1$
Ten	The unit's digit is zero.	$36 \boxed{0}$

## Exercises

Use the divisibility rules.

Tell which are divisible by 3, and which by 4.

1. 39

2. 48

3. 54

4. 116

5. 165

6. 404

7. 639

8. 1272

9. 17 008

10. 25 476

Tell which are divisible by 3, and which by 6.

11. 42

12. 63

13. 84

14. 201

15. 210

16. 723

17. 732

18. 5874

19. 25 482

20. 100 002

Tell which are divisible by 3, and which by 9.

21. 21

22. 45

23. 102

24. 549

25. 594

26. 2823

27. 9720

28. 34 860

29. 300 003

30. 500 076

Tell which are divisible by 8, and which by 10.

31. 3410

32. 4168

33. 5234

34. 56 170

35. 30 256

36. 173 564

37. 81 432

38. 72 345

39. 63 008

40. 7 000 000

State whether these numbers are divisible  
by 2; by 3; by 4; by 5; by 6; by 7; by 9; or by 10.

41. 24

42. 40

43. 72

44. 100

45. 108

46. 136

47. 288

48. 306

49. 352

50. 1000

Tell whether these statements are true or false. Explain.

★ 51. "All numbers divisible by 8 are also divisible by 2 and 4."

★ 52. "All numbers divisible by 9 are also divisible by 3."

★ 53. "All numbers divisible by 3 are also divisible by 9."

★ 54. "All numbers divisible by 6 are also divisible by 2 and 3."

★ 55. "All numbers divisible by 5 are also divisible by 10."

TRUE  
or  
FALSE

# Factors

These rectangles can be made by using 20 squares.



$$1 \times 20 = 20$$

1 and 20 are factors of 20.



$$2 \times 10 = 20$$

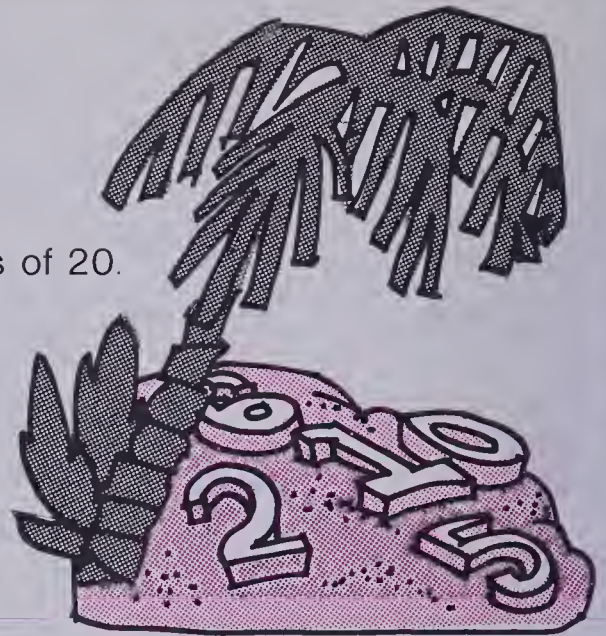
2 and 10 are factors of 20.



$$4 \times 5 = 20$$

factor
factor
product

4 and 5 are factors of 20.



The factors of 20 are 1, 2, 4, 5, 10, and 20.

## Exercises

Copy and find the missing factors.

1.  $1 \times \blacksquare = 18$

$\blacksquare \times 9 = 18$

$3 \times \blacksquare = 18$

The factors of 18 are 1,  $\blacksquare$ , 3,  $\blacksquare$ , 9, and  $\blacksquare$ .

2.  $1 \times \blacksquare = 24$

$\blacksquare \times 12 = 24$

$\blacksquare \times 8 = 24$

$4 \times \blacksquare = 24$

The factors of 24 are 1,  $\blacksquare$ ,  $\blacksquare$ , 4,  $\blacksquare$ , 8, 12, and  $\blacksquare$ .

3.  $1 \times \blacksquare = 36$

$2 \times \blacksquare = 36$

$\blacksquare \times 12 = 36$

$4 \times \blacksquare = 36$

$6 \times \blacksquare = 36$

The factors of 36 are 1, 2,  $\blacksquare$ , 4,  $\blacksquare$ ,  $\blacksquare$ , 12,  $\blacksquare$ , and  $\blacksquare$ .

4.  $1 \times \blacksquare = 42$

$2 \times \blacksquare = 42$

$3 \times \blacksquare = 42$

$6 \times \blacksquare = 42$

The factors of 42 are 1, 2, 3, 6,  $\blacksquare$ ,  $\blacksquare$ ,  $\blacksquare$ , and  $\blacksquare$ .

5.  $1 \times \blacksquare = 50$

$2 \times \blacksquare = 50$

$5 \times \blacksquare = 50$

The factors of 50 are 1, 2, 5,  $\blacksquare$ ,  $\blacksquare$ , and  $\blacksquare$ .

Write all the factors for each of the following numbers.

6. 10

7. 21

8. 30

9. 33

10. 40

11. 45

12. 48

13. 56

14. 60

15. 100





# Charting Factors

What are the factors of 24?

$$\blacktriangle \times \blacksquare = 24$$

$\blacktriangle$	$\blacksquare$
1	24
2	12
3	8
4	6

because  $1 \times 24 = 24$

because  $2 \times 12 = 24$

because  $3 \times 8 = 24$

because  $4 \times 6 = 24$

The factors of 24 are

1, 2, 3, 4, 6, 8, 12, and 24.

What are the factors of 32?

$$\blacktriangle \times \blacksquare = 32$$

$\blacktriangle$	$\blacksquare$
1	32
2	16
4	8

because  $1 \times 32 = 32$

because  $2 \times 16 = 32$

because  $4 \times 8 = 32$

The factors of 32 are

1, 2, 4, 8, 16, and 32.

## Exercises

Complete these factor charts.

List the factors of 40, 28, and 27.

1.  $\blacktriangle \times \blacksquare = 40$

$\blacktriangle$	$\blacksquare$

2.  $\blacktriangle \times \blacksquare = 28$

$\blacktriangle$	$\blacksquare$

3.  $\blacktriangle \times \blacksquare = 27$

$\blacktriangle$	$\blacksquare$

Make factor charts for these.

4.  $\blacktriangle \times \blacksquare = 16$

5.  $\blacktriangle \times \blacksquare = 20$

6.  $\blacktriangle \times \blacksquare = 30$

7.  $\blacktriangle \times \blacksquare = 36$

8.  $\blacktriangle \times \blacksquare = 25$

9.  $\blacktriangle \times \blacksquare = 64$

10.  $\blacktriangle \times \blacksquare = 72$

11.  $\blacktriangle \times \blacksquare = 90$

12.  $\blacktriangle \times \blacksquare = 108$

13. (a) In Exercises 4-12, write the set of factors for each product.

(b) Count the number of factors for each product.

Which numbers have an odd number of factors?

★ (c) Numbers that have an odd number of factors are special.

What are they called?

# Zeros and Ones

## Multiplication

$$6 \times 1 = 6$$

$$1 \times 6 = 6$$

A number multiplied by 1 is the number itself.

$$0 \times 4 = 0$$

A number multiplied by 0 is 0.

## Division

$$6 \div 1 = 6$$

A number divided by 1 is the number itself.

$$6 \div 6 = 1$$

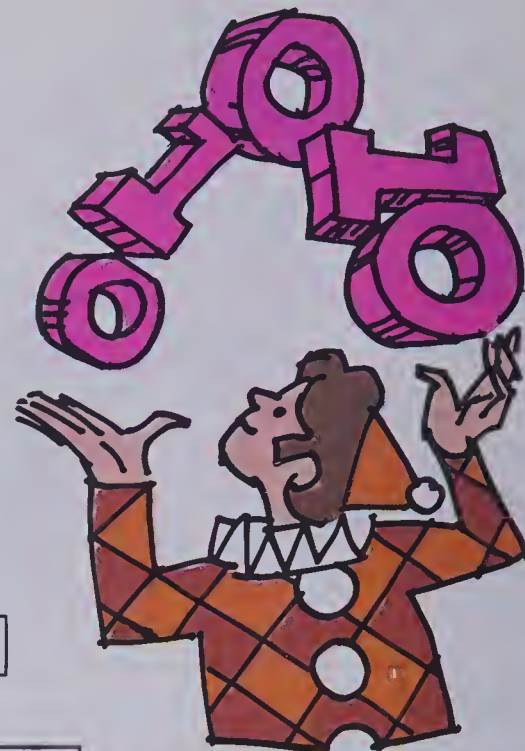
A number divided by itself is 1.

$$0 \div 4 = 0$$

0 divided by a number is 0.

5  $\div$  0 is meaningless.

Division by zero is meaningless.



## Exercises

Copy and complete where possible.

- |                      |                       |                      |                    |                      |
|----------------------|-----------------------|----------------------|--------------------|----------------------|
| 1. $7 \times 1$      | 2. $1 \times 8$       | 3. $12 \div 1$       | 4. $73 \times 1$   | 5. $28 \div 1$       |
| 6. $0 \times 9$      | 7. $17 \times 0$      | 8. $0 \div 2$        | 9. $0 \div 10$     | 10. $37 \times 0$    |
| 11. $14 \times 1$    | 12. $14 \div 0$       | 13. $14 \div 14$     | 14. $0 \div 14$    | 15. $8 \div 8$       |
| 16. $7 \times n = 7$ | 17. $7 \div n = 7$    | 18. $7 \div 7 = n$   | 19. $n \div 8 = 0$ | 20. $12 \div n = 12$ |
| 21. $50 \div n = 1$  | 22. $13 \times n = 0$ | 23. $n \times 8 = 0$ | 24. $n \div 2 = 0$ | 25. $15 \div n = 1$  |

## Tune Up

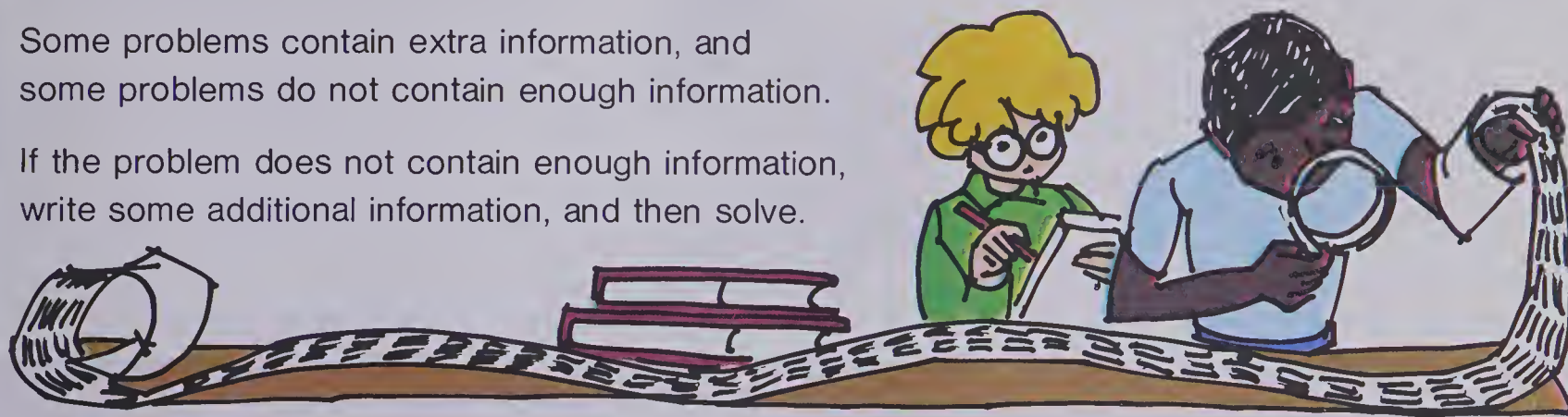
Watch your operation signs.

- |                                  |                                  |                               |                                |
|----------------------------------|----------------------------------|-------------------------------|--------------------------------|
| 1. $6 + 0 = \blacksquare$        | 2. $8 - 0 = \blacksquare$        | 3. $0 + 12 = \blacksquare$    | 4. $1 + 7 = \blacksquare$      |
| 5. $19 + 0 = \blacksquare$       | 6. $12 \times 1 = \blacksquare$  | 7. $18 \div 1 = \blacksquare$ | 8. $0 \div 2 = \blacksquare$   |
| 9. $1 \times 10 = \blacksquare$  | 10. $0 \times 20 = \blacksquare$ | 11. $19 + 1 = \blacksquare$   | 12. $19 \div 1 = \blacksquare$ |
| 13. $19 \times 1 = \blacksquare$ | 14. $19 \times 0 = \blacksquare$ | 15. $19 - 0 = \blacksquare$   |                                |

# Information — Too Little or Too Much!

Some problems contain extra information, and some problems do not contain enough information.

If the problem does not contain enough information, write some additional information, and then solve.



## Exercises

1. Jody has a part-time delivery job.  
She earns \$3.25/h.  
How much does she earn in a week?
2. The hockey team purchased 5 dozen hockey sticks and 30 pucks.  
Sticks sell for \$8.50 each and pucks sell for \$1.80 each.  
What is the total cost of the sticks?
3. Miss Bennett's class collected \$32.40 for charity.  
There are 24 students in the class — 10 boys and 14 girls.  
What was the average donation for each student?
4. Mr. Kowalski's class collected \$51.20 for charity.  
What was the average donation for each student?
5. One afternoon, Joan spent 2 h gardening.  
She spent 20 min trimming the hedge, a half hour mowing the lawn, 40 min raking leaves,  
and the rest of the time weeding the garden.  
How much time altogether did Joan spend mowing the lawn and raking leaves?
6. The MacPhersons' electricity bill was \$62.40 for the month of February.  
What was the average cost for electricity per day?





# Prime Numbers and Composite Numbers

**Prime numbers** have exactly two different factors.

$$7 = 7 \times 1$$

$$11 = 11 \times 1$$

The two factors are 1 and the number itself.

7 and 11 are prime numbers.



**Composite numbers** have more than two different factors.

$$8 = 1 \times 8$$

$$8 = 2 \times 4$$

The factors of 8 are 1, 2, 4, and 8.

8 is a composite number.

The number 1 is neither prime nor composite as  $1 = 1 \times 1$ . It has only one factor, 1.

## Exercises

- Copy and complete this chart, using the numbers 2, 3, 4, 5, 9, 10, 12, 13, 15, 18, 22, 23, 25, 27, 29, 31, 35, and 36.

Number	Products	Factors	Kind of Number
2	$2 \times 1 = 2$	1, 2	Prime
3	$3 \times 1 = 3$	1, 3	Prime
4	$4 \times 1 = 4$ $2 \times 2 = 4$	1, 2, 4	Composite
5	$5 \times 1 = 5$	1, 5	Prime

- List the composite numbers greater than 39 and less than 51.
- List the prime numbers greater than 39 and less than 51.
- List the prime numbers between 50 and 70.

- Most even numbers are composite numbers. Why is this true?

- ★ **Twin primes** are pairs of primes that are two apart. For example, 3 and 5 are twin primes. List all twin primes less than 75.



# Special Numbers

## An Investigation

All composite numbers have more than two different factors.

Let's investigate the number of factors that some composite numbers have.

- Copy and complete this chart using the numbers 4, 6, 8, 9, 14, 16, 21, 25, 27, 30, 36, 48, 49, 56, 64, 75, 81, 96, and 100.

Number	Factors	Number of Factors
4	1, 2, 4	Three
6	1, 2, 3, 6	Four
8	1, 2, 4, 8	Four
9	■, ■, ■	Three

- Which of the numbers from Exercise 1 have an *odd* number of factors? List them.
- Which whole number has only one factor?
- Numbers with an *odd* number of factors are special. What are these numbers called?

## BRAINTICKLER

Add these odd numbers.

$$1 + 3 = \blacksquare$$

$$1 + 3 + 5 = \blacksquare$$

$$1 + 3 + 5 + 7 = \blacksquare$$

$$1 + 3 + 5 + 7 + 9 = \blacksquare$$

$$1 + 3 + 5 + 7 + 9 + 11 = \blacksquare$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 = \blacksquare$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 = \blacksquare$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = \blacksquare$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = \blacksquare$$

The sums are special numbers.

What are these numbers called?

# Step Division

We can find the prime factors of a number by using **step division**.

Step division is  
*repeated*  
*short division*.

Choose prime  
divisors.

$$\begin{array}{r} 5 \\ 3 \overline{) 15} \\ 2 \overline{) 30} \end{array}$$

This is a  
prime number,  
too.

$$\begin{array}{r} 3 \\ 2 \overline{) 6} \\ 2 \overline{) 12} \end{array}$$

$$\rightarrow 12 = 2 \times 2 \times 3$$

$$\rightarrow 30 = 2 \times 3 \times 5$$

12 as a product is  $2 \times 2 \times 3$ .

30 as a product is  $2 \times 3 \times 5$ .



## Exercises

1. Copy and complete these step divisions.  
Write the missing factors.

(a)

$$\begin{array}{r} \blacksquare \\ 2 \overline{) \blacksquare} \\ 2 \overline{) 12} \end{array}$$

$$12 = 2 \times 2 \times \blacksquare$$

(b)

$$\begin{array}{r} \blacksquare \\ \blacksquare \overline{) \blacksquare} \\ \blacksquare \overline{) 8} \\ \blacksquare \overline{) 16} \end{array}$$

$$16 = 2 \times \blacksquare \times \blacksquare \times \blacksquare$$

(c)

$$\begin{array}{r} \blacksquare \\ \blacksquare \overline{) 9} \\ 3 \overline{) 27} \end{array}$$

$$27 = 3 \times \blacksquare \times \blacksquare$$

2. Use step division. Write products for each number.

(a)  $\underline{\hspace{1cm}} \overline{) 20}$

(b)  $\underline{\hspace{1cm}} \overline{) 27}$

(c)  $\underline{\hspace{1cm}} \overline{) 36}$

(d)  $\underline{\hspace{1cm}} \overline{) 42}$

(e)  $\underline{\hspace{1cm}} \overline{) 50}$

(f)  $\underline{\hspace{1cm}} \overline{) 56}$

(g)  $\underline{\hspace{1cm}} \overline{) 65}$

(h)  $\underline{\hspace{1cm}} \overline{) 100}$

3. Use step division. Write products for each.

(a) 96

(b) 104

(c) 110

(d) 116

(e) 140

(f) 168

(g) 200

★ (h) 225

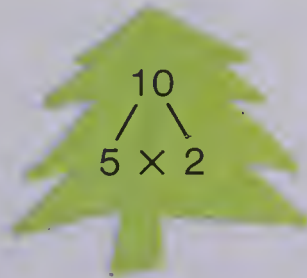
★ (i) 320

★ (j) 576

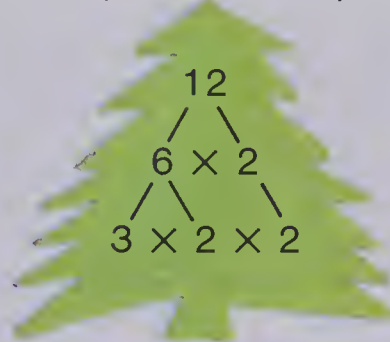


# Factor Trees

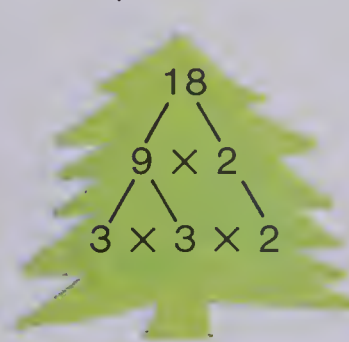
All composite numbers can be expressed as a *product of prime factors*.



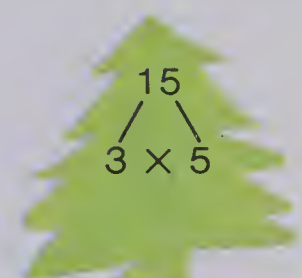
$$10 = 2 \times 5$$



$$12 = 2 \times 2 \times 3$$



$$18 = 2 \times 3 \times 3$$



$$15 = 3 \times 5$$

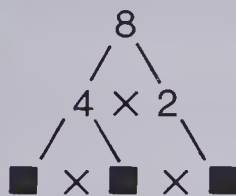
Keep building the factor tree until all the factors are prime numbers.

## Exercises

Copy and finish these factor trees.

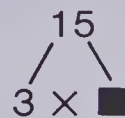
Write each number as the product of prime factors.

1. (a)



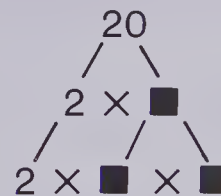
$$8 = \square \times \square \times \square$$

(b)



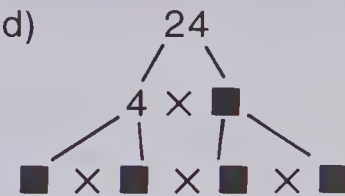
$$15 = \square \times \square$$

(c)



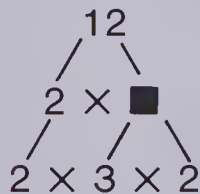
$$20 = 2 \times \square \times \square$$

(d)



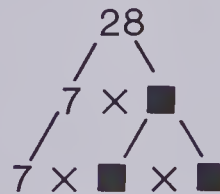
$$24 = \square \times \square \times \square \times \square$$

2. (a)



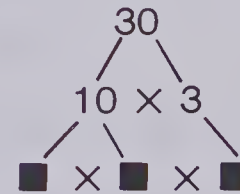
$$12 = \square \times \square \times \square$$

(b)



$$28 = \square \times \square \times \square$$

(c)



$$30 = \square \times \square \times \square$$

3. Build a factor tree.

Write each number as a product of prime factors.

(a) 36

(b) 40

(c) 42

(d) 48

(e) 54

(f) 56

(g) 60

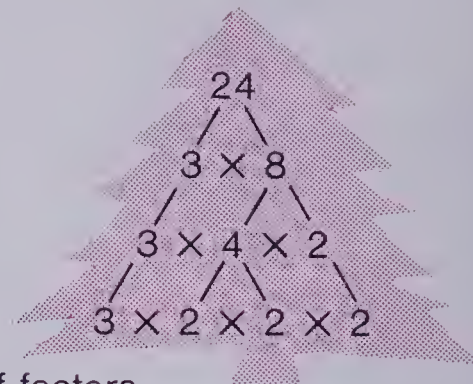
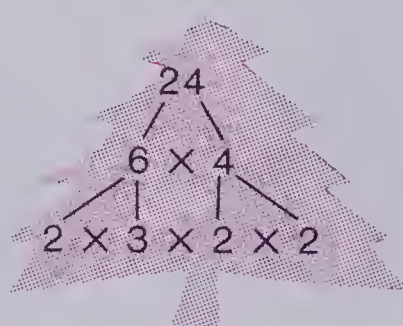
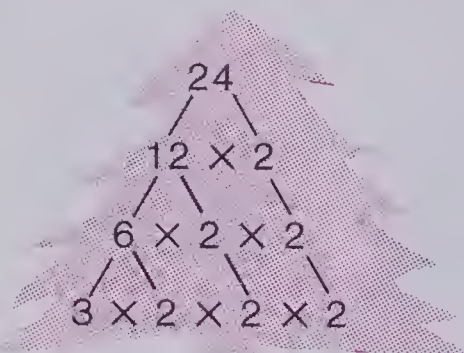
(h) 64

(i) 70

(j) 72

# Prime Factorization

Factor trees help in finding the **prime factorization**.



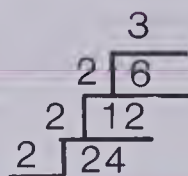
The above factor trees look different, but result in the same set of factors.

The prime factorization

of  $24 = 2 \times 2 \times 2 \times 3$

smallest

largest



Using step  
division

$$24 = 2 \times 2 \times 2 \times 3.$$

When every factor is prime, we have prime factorization.

## Exercises

1. Find the missing *prime* factors.

(a)  $24 = 2 \times \blacksquare \times 2 \times 3$

(b)  $30 = 2 \times \blacksquare \times 5$

(c)  $32 = 2 \times \blacksquare \times 2 \times \blacksquare \times \blacksquare$

(d)  $48 = 2 \times \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare$

(e)  $54 = \blacksquare \times \blacksquare \times \blacksquare \times 3$

(f)  $81 = \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare$

(g)  $52 = 2 \times 2 \times \blacksquare$

(h)  $21 = \blacksquare \times \blacksquare$

(i)  $44 = \blacksquare \times \blacksquare \times 11$

(j)  $92 = 2 \times \blacksquare \times \blacksquare$

Write the following as a product of prime factors.

2. (a) 27

(b) 32

(c) 35

(d) 45

(e) 50

(f) 66

(g) 75

(h) 80

(i) 88

(j) 96

★ 3. (a) 120

(b) 108

(c) 132

(d) 144

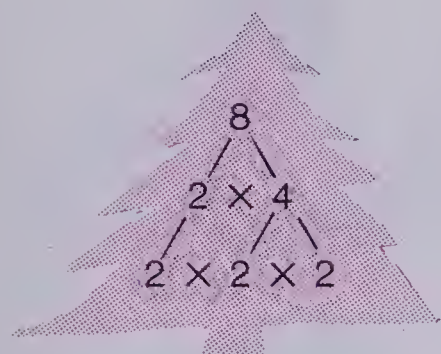
(e) 175

(f) 192

(g) 196

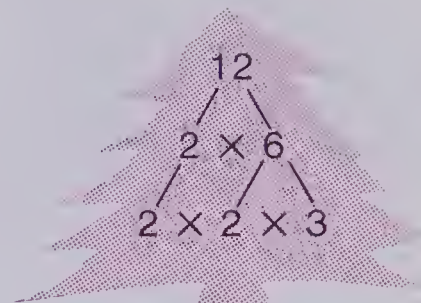
(h) 200

# Greatest Common Factor (GCF)



$$8 = \textcircled{2} \times \textcircled{2} \times 2$$

Factor trees



$$12 = \textcircled{2} \times \textcircled{2} \times 3$$

Prime factorization

Circle the common factors in each.

The **G**reatest **C**ommon **F**actor of 8 and 12  
is  $\textcircled{2} \times \textcircled{2}$  or  $\boxed{4}$ .

## Exercises

What is the greatest common factor for each pair of numbers?

1. (a) 9, 12      (b) 15, 35      (c) 8, 10      (d) 16, 24      (e) 10, 25  
(f) 12, 30      (g) 14, 28      (h) 6, 1      (i) 16, 36      (j) 20, 32
2. (a) 12, 15      (b) 18, 24      (c) 10, 14      (d) 6, 16      (e) 8, 24  
(f) 18, 30      (g) 20, 30      (h) 21, 35      (i) 18, 45      (j) 22, 55

★ 3. Find the greatest common factor for these sets of three numbers.

- |                |                |                |
|----------------|----------------|----------------|
| (a) 8, 10, 12  | (b) 12, 18, 36 | (c) 15, 25, 35 |
| (d) 12, 21, 27 | (e) 24, 40, 56 | (f) 28, 42, 70 |



# Practice



1. List all the rectangles that can be drawn by using the following.  
(a) 16 squares                      (b) 21 squares                      (c) 30 squares
2. Which numbers are divisible by 3? by 5? by 9?  
7, 12, 18, 25, 27, 39, 42, 50
3. Write the set of factors for each.  
(a) 16                      (b) 21                      (c) 32                      (d) 35                      (e) 40
4. Find the missing prime factors.  
(a)  $18 = 2 \times 3 \times \blacksquare$                       (b)  $22 = 2 \times \blacksquare$   
(c)  $24 = 2 \times 2 \times \blacksquare \times \blacksquare$                       (d)  $36 = 2 \times 2 \times \blacksquare \times \blacksquare$   
(e)  $42 = \blacksquare \times 3 \times \blacksquare$                       (f)  $48 = \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare$
5. Which of these numbers are prime?  
1, 2, 3, 4, 8, 15, 17, 21, 29, 31, 35, 39
6. Write a pair of twin primes greater than 20 and less than 100.
7. Use step division to find the prime factorization for each.  
(a) 28                      (b) 40                      (c) 52                      (d) 96
8. Build factor trees and write the prime factorization for each.  
(a) 21                      (b) 32                      (c) 75                      (d) 92
9. Find the greatest common factor for each pair of numbers.  
(a) 3, 12                      (b) 8, 20                      (c) 10, 25                      (d) 18, 60
- ★ 10. There are more composite numbers than prime numbers from 1000 to 2000.  
Explain why this is true.

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, ...

3, 6, 9, 12, 15, 18, 21, 24, 27, ...

6, 12, 18, 24, . . .

Copy and write the next 10 multiples.

1. The multiples of 4 are: 4, 8, ■, ■, ■, ■, ■, ■, ■, ■, ■, ■, ■.
2. The multiples of 6 are: 6, 12, . . . .
3. The multiples of 7 are: 7, 14, 21, . . . .
4. The multiples of 8 are: 8, 16, . . . .

5. 3, 6, 9, ■, 15, 18, ■, ■, ■, 30, ■, ■, ■, 42, ■
6. 5, 10, 15, 20, ■, 30, ■, ■, ■, 50, 55, ■, ■, ■, 75
7. 9, 18, ■, 36, ■, 54, ■, 72, ■, 90, ■, 108
8. 10, 20, 30, ■, ■, ■, 70, ■, ■, 100, ■, ■, ■, 140
9. 12, 24, ■, 48, ■, 72, ■, 96, ■, 120, ■, 144

★12. Three common multiples of 2, 3, and 6.



# Least Common Multiple (LCM)

The multiples of 3 are:

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, ....

The multiples of 5 are:

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, ....

The common multiples of 3 and 5 are:

15, 30, 45, ....

The Least Common Multiple of 3 and 5 is 15.



## Exercises

1. List ten multiples of 2.  
List ten multiples of 5.  
What is the LCM of 2 and 5?
2. List ten multiples of 3.  
List ten multiples of 7.  
What is the LCM of 3 and 7?
3. List ten multiples of 4.  
List ten multiples of 3.  
What is the LCM of 4 and 3?
4. List ten multiples of 5.  
List ten multiples of 9.  
What is the LCM of 5 and 9?
5. List twenty multiples of 2.  
List ten multiples of 3.  
List ten multiples of 5.  
What is the LCM of 2, 3, and 5?

List multiples to find the LCM for the following pairs of numbers.

- |          |           |           |          |           |
|----------|-----------|-----------|----------|-----------|
| 6. 4, 5  | 7. 2, 7   | 8. 4, 6   | 9. 6, 9  | 10. 4, 10 |
| 11. 5, 8 | 12. 9, 12 | 13. 6, 10 | 14. 8, 6 | 15. 6, 15 |

Find the LCM for the following sets of three numbers.

- |             |             |              |              |             |
|-------------|-------------|--------------|--------------|-------------|
| 16. 2, 4, 5 | 17. 3, 4, 6 | 18. 4, 5, 10 | 19. 6, 5, 10 | 20. 3, 6, 8 |
|-------------|-------------|--------------|--------------|-------------|



# The Lab Technician

The High-Light Paint Company has a large chemical laboratory where chemists develop and test new paints.

Georgio is a lab technician and one of his jobs is to order supplies for the laboratory.

Georgio wants to order calculators and power adapters, and the supplier ships only carton lots.

What is the smallest order he could place so that he has an equal number of each?

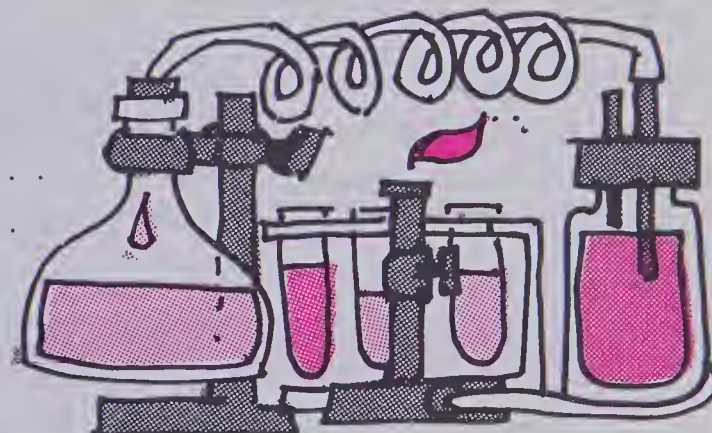
*Solution:* The multiples of 8 are 8, 16, 24, 32, 40, . . .  
The multiples of 12 are 12, 24, 36, 48, . . .  
The LCM is 24.

He could order 24 of each;  
3 cartons of calculators and 2 cartons of adapters.



Calculators  
8 per carton

Power adapters  
12 per carton



## Exercises

- Georgio wants to order an equal number of flasks and glass tubes. Flasks are shipped 12 per carton. Glass tubes are shipped 20 per carton. How many of each should he order?
- Georgio is ordering Bunsen burners and gas lines. Gas lines are packaged 10 per carton. Bunsen burners are packaged 8 per carton. How many should he order so that he has a gas line for each Bunsen burner?
- Electronic scales are shipped in cartons of 24. AC power packs are shipped in cartons of 30. How many of each must be ordered so that each electronic scale will have an AC power pack?
- ★ Paint mixers are shipped in cartons of 24. Batteries are shipped in cartons of 40. Each paint mixer uses 2 batteries. How many of each should be ordered so that there are 2 batteries for each paint mixer?

# Powerful Tens

## Powers

$10^1$	means
$10^2$	means
$10^3$	means
$10^4$	means
$10^5$	means
$10^6$	means

## Products

10
$10 \times 10$
$10 \times 10 \times 10$
$10 \times 10 \times 10 \times 10$
$10 \times 10 \times 10 \times 10 \times 10$
$10 \times 10 \times 10 \times 10 \times 10 \times 10$

## Numbers

=	10
=	100
=	1000
=	10 000
=	100 000
=	1 000 000

$10^4$  is a **power of ten**.  
The 10 is the **base**.  
The 4 is the **exponent**.



## Exercises

Write as a power.

1.  $100 = 10^2$

2.  $1000 = 10^{\blacksquare}$

3.  $100\ 000 = 10^{\blacksquare}$

4.  $1\ 000\ 000 = \blacksquare$

5.  $100\ 000\ 000 = \blacksquare$

6.  $1\ 000\ 000\ 000 = \blacksquare$

Write as products of 10.

7.  $10^3 = 10 \times 10 \times 10$

8.  $10^2 = \blacksquare \times \blacksquare$

9.  $10^5 = \blacksquare$

10.  $10^8 = \blacksquare$

11.  $10^6 = \blacksquare$

12.  $10^9 = \blacksquare$

Write as a single number.

13.  $10^3 = 10 \times 10 \times 10 = 1000$

14.  $10^2 = \blacksquare \times \blacksquare = \blacksquare$

15.  $10^5 = \blacksquare$

16.  $10^8 = \blacksquare$

17.  $10^9 = \blacksquare$

Find the products.

18.  $3 \times 10^2 = 3 \times 10 \times 10 = 300$

19.  $5 \times 10^1 = 5 \times 10 = \blacksquare$

20.  $7 \times 10^3 = 7 \times \blacksquare \times \blacksquare \times \blacksquare = \blacksquare$

21.  $9 \times 10^5 = \blacksquare$

Write each of these as a single digit times a power of 10.

22.  $300 = 3 \times 100$   
 $= 3 \times 10^2$

23.  $50 = 5 \times \blacksquare$   
 $= 5 \times \blacksquare$

★ 24.  $40\ 000 = 4 \times \blacksquare$   
 $= 4 \times \blacksquare$

# Expanded Notation

$2 \times 1\,000\,000 = 2 \times 10^6$	$5 \times 100\,000 = 5 \times 10^5$	$3 \times 10\,000 = 3 \times 10^4$	$8 \times 1\,000 = 8 \times 10^3$	$7 \times 100 = 7 \times 10^2$	$6 \times 10 = 6 \times 10^1$	$4 \times 1$
millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
2	5	3	8	7	6	4

We say: "two million, five hundred thirty-eight thousand, seven hundred sixty-four."

In **expanded notation** 2 538 764 is:

$$(2 \times 1\,000\,000) + (5 \times 100\,000) + (3 \times 10\,000) + (8 \times 1\,000) + (7 \times 100) + (6 \times 10) + (4 \times 1)$$

$$(2 \times 10^6) + (5 \times 10^5) + (3 \times 10^4) + (8 \times 10^3) + (7 \times 10^2) + (6 \times 10^1) + (4 \times 1).$$

Powers of ten show the place value of the digits.

## Exercises

Find the missing numerals or powers of ten.

- $635 = (6 \times 10^2) + (3 \times 10^1) + (5 \times \blacksquare)$
- $427 = (\blacksquare \times 10^2) + (2 \times \blacksquare) + (7 \times \blacksquare)$
- $1289 = (1 \times 10^3) + (\blacksquare \times 10^2) + (\blacksquare \times \blacksquare) + (\blacksquare \times 1)$
- $8375 = (\blacksquare \times \blacksquare) + (3 \times 10^2) + (\blacksquare \times \blacksquare) + (\blacksquare \times \blacksquare)$
- $3042 = (\blacksquare \times 10^3) + (0 \times 10^2) + (\blacksquare \times 10^1) + (2 \times \blacksquare)$   
or  $(\blacksquare \times 10^3) + (\blacksquare \times 10^1) + (2 \times \blacksquare)$
- $208 = (2 \times \blacksquare) + (\blacksquare \times \blacksquare)$
- $9003 = (9 \times \blacksquare) + (\blacksquare \times \blacksquare)$
- $30\,702 = (3 \times \blacksquare) + (7 \times \blacksquare) + (2 \times \blacksquare)$

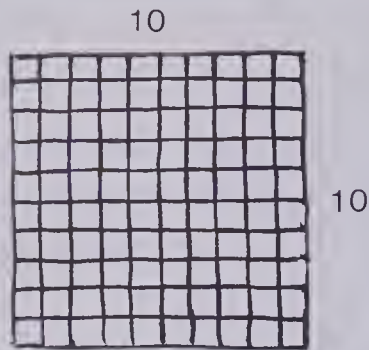
Write in expanded notation.

- 238
- 519
- 4239
- 7010
- 9005
- 85 027
- 300
- 7000
- 50 000
- 90
- 8 000 000
- 100 000



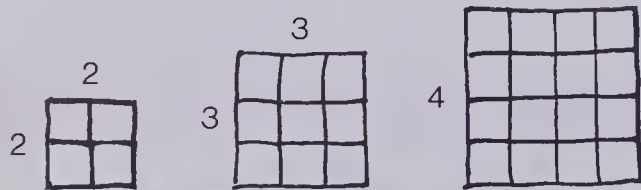


# Squares and Cubes

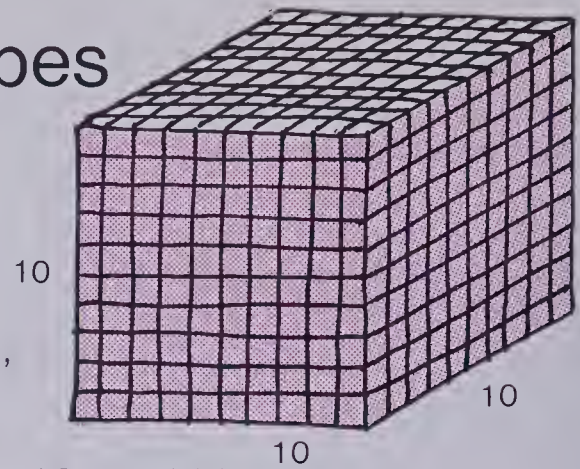


This is “10 squared”  
or  $10^2$  which  
equals 100.

Here are some other squares.

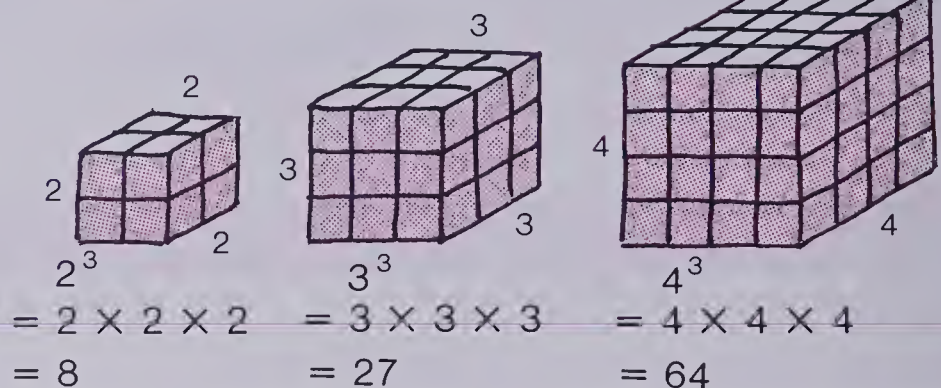


$$2^2 = 4 \quad 3^2 = 9 \quad 4^2 = 16$$



This is “10 cubed”  
or  $10^3$  which  
equals  $10 \times 10 \times 10$  or 1000.

Here are some other cubes.



$$2^3 = 2 \times 2 \times 2 = 8$$

$$3^3 = 3 \times 3 \times 3 = 27$$

$$4^3 = 4 \times 4 \times 4 = 64$$

## Exercises

Copy and complete these charts.

1.

Power	Meaning	Standard Numeral
$2^2$	$2 \times 2$	4
$3^2$	$3 \times 3$	9
$4^2$	$4 \times 4$	16
$5^2$	■	■
$6^2$	■	■
$7^2$	■	■
$8^2$	■	■
$9^2$	■	■
$10^2$	■	■

2.

Power	Meaning	Standard Numeral
$2^3$	$2 \times 2 \times 2$	8
$3^3$	$3 \times 3 \times 3$	27
$4^3$	$4 \times 4 \times 4$	64
$5^3$	■	■
$6^3$	■	■
$7^3$	■	■
$8^3$	■	■
$9^3$	■	■
$10^3$	■	■

3. Find the products.

(a)  $5 \times 4^2$  (b)  $10 \times 3^2$  (c)  $7 \times 2^3$  (d)  $5^2 \times 2^3$  (e)  $3^2 \times 4^2$  (f)  $6^2 \times 3^2$

# Squares, Cubes, and Other Powers

$5^3$  is a **power**.

5 is the **base**.

$$5 \times 5 = 25$$

3 is the **exponent**.

$$25 \times 5 = 125$$

$5^3$  means  $5 \times 5 \times 5$ , which equals 125

## Exercises

Write as a product of factors.

1.  $5^4 = 5 \times 5 \times 5 \times 5$

2.  $7^3 = \blacksquare \times \blacksquare \times \blacksquare$

3.  $2^4$

4.  $6^3$

5.  $10^3$

6.  $8^5$

Write as a power.

7.  $3 \times 3 \times 3 \times 3 \times 3 = 3^5$

8.  $5 \times 5 \times 5 = \blacksquare$

9.  $7 \times 7 \times 7 \times 7 \times 7 \times 7 = \blacksquare$

10.  $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = \blacksquare$

11.  $9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9 = \blacksquare$

12.  $12 \times 12 \times 12 \times 12 = \blacksquare$

Write as a product of factors and solve.

13.  $7^2 = 7 \times 7 = \blacksquare$

14.  $2^5 = 2 \times 2 \times 2 \times 2 \times 2 = \blacksquare$

15.  $3^4 = \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare = \blacksquare$

16.  $4^5 = \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare = \blacksquare$

17.  $2^2 \times 3^2 = 2 \times 2 \times 3 \times 3 = \blacksquare$

18.  $2^3 \times 4^2 = \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare = \blacksquare$

19.  $3^2 \times 5^2 = \blacksquare$

20.  $7^2 \times 3^2 = \blacksquare$

21.  $6^2 \times 8^2 = \blacksquare$

★ Which is greater?

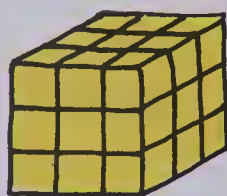
22.  $2^6$  or  $6^2$

23.  $2^3$  or  $3^2$

24.  $2^8$  or  $8^2$

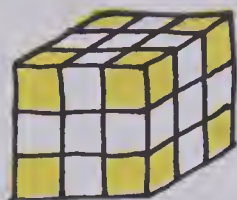
25.  $3^5$  or  $5^3$

# Painted Prisms

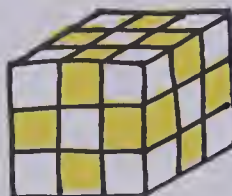


This large cube is made of 27 small cubes. The outside of the whole shape is painted yellow.

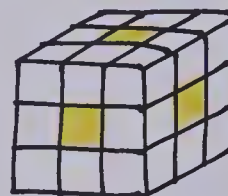
8 cubes have paint on 3 surfaces.



12 cubes have paint on only 2 surfaces.



6 cubes have paint on only 1 surface.



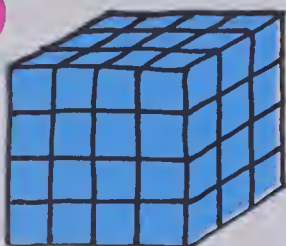
1 cube has no painted surfaces.  
(It is hidden in the centre of the large cube.)

Painted Surfaces	Number of Cubes
3	8
2	12
1	6
0	1
Total	27

## Exercises

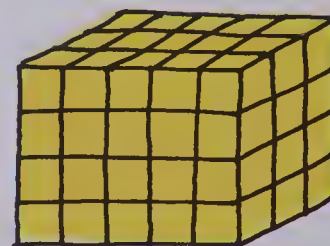
Determine the painted surfaces to complete the charts. Calculate the volume of each cube.

1.



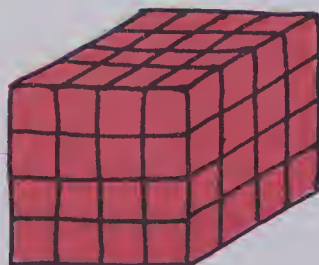
Painted Surfaces	Number of Cubes
3	
2	
1	
0	
Total	

2.



Painted Surfaces	Number of Cubes
3	
2	
1	
0	
Total	

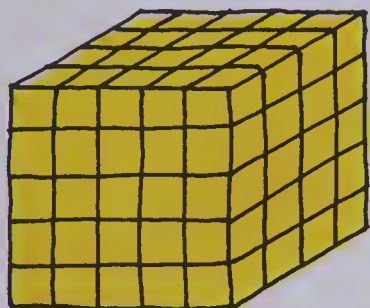
3.



Painted Surfaces	Number of Cubes
3	
2	
1	
0	
Total	

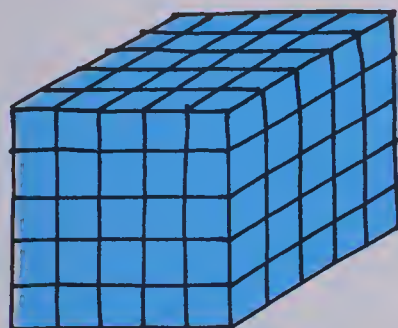


4.



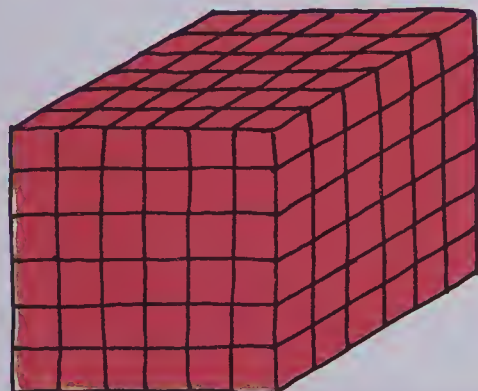
Painted Surfaces	Number of Cubes
3	
2	
1	
0	
Total	

5.



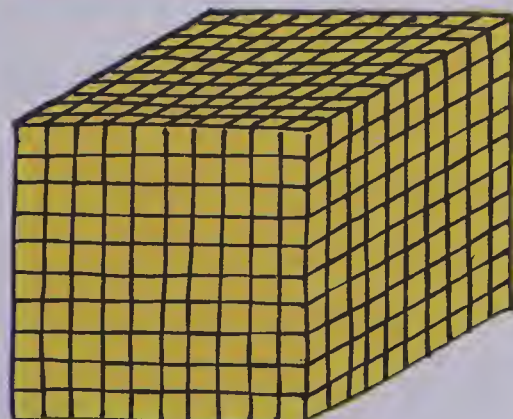
Painted Surfaces	Number of Cubes
3	
2	
1	
0	
Total	

6.

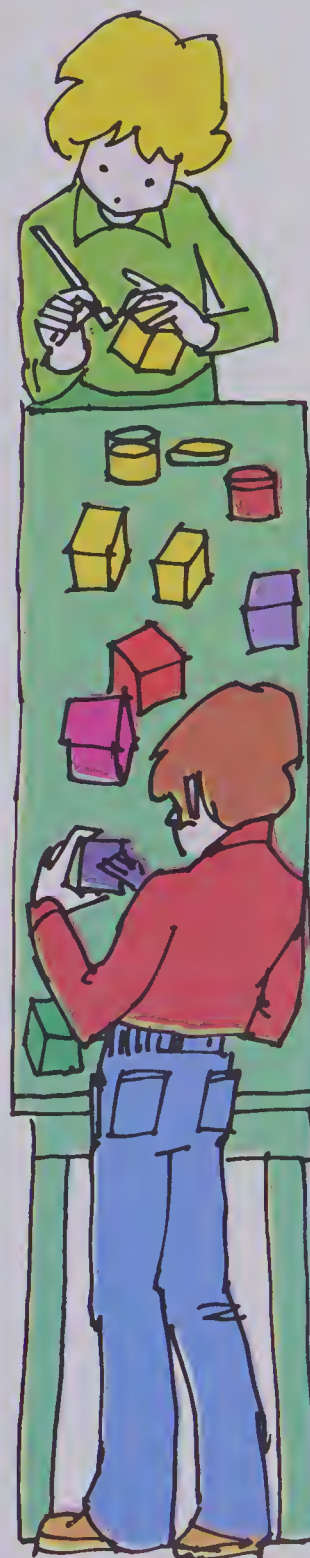


Painted Surfaces	Number of Cubes
3	
2	
1	
0	
Total	

★7.



Painted Surfaces	Number of Cubes
3	
2	
1	
0	
Total	



# Chapter Test

1. For each of the following, list all the possible multiplication and division facts.  
(a) 10                      (b) 32                      (c) 54                      (d) 60
2. List the set of all factors for each of the following numbers.  
(a) 12                      (b) 20                      (c) 36                      (d) 50
3. List the first 10 prime numbers greater than 1.
4. List the first 10 composite numbers greater than 1.
5. Find the prime factorization (product of prime factors) for each number.  
(a) 12                      (b) 30                      (c) 42                      (d) 54                      (e) 90
6. Find the greatest common factor for the following sets of numerals.  
(a) 10, 35                      (b) 8, 20                      (c) 12, 42                      (d) 10, 32
7. Find the least common multiple for the following sets of numerals.  
(a) 6 and 10                      (b) 15 and 20                      (c) 30 and 40                      (d) 30 and 42
8. Write as a single numeral.  
(a)  $10^2 = \blacksquare$                       (b)  $2^3 = \blacksquare$                       (c)  $3^4 = \blacksquare$                       (d)  $3 \times 10^3 = \blacksquare$
9. Write each of the following numerals in expanded notation.  
(a) 427                      (b) 3795                      (c) 8009
10. Which is larger?  
(a)  $2^5$  or  $5^2$                       (b)  $4^2$  or  $2^4$
11. Loose-leaf notebooks are shipped in cartons of 12.  
Loose-leaf refills are shipped in cartons of 30.  
How many of each should be ordered so that notebooks can be sold with 1 refill in each one?

# Cumulative Review

Perform the individual operations.

1.  $1705 + 378 + 3927 + 53$
2.  $3579 - 982$
3.  $389 \times 62$
4.  $2983 \div 21$
5.  $\$27.28 + \$107.92 + \$5.75$
6.  $\$182.15 - \$99.99$
7.  $450 \times 3.8$
8.  $17.8 \times 0.3$
9.  $38.9 \div 0.01$
10.  $42.8 \div 0.2$
11.  $\$30.08 \div 12$
12.  $\$72.50 \div 0.5$
13.  $7 \times 10^3$
14.  $5^2 \times 10^2$

Express the following as decimals.

15.  $3\frac{7}{10}$
16.  $15\frac{32}{100}$
17.  $2\frac{17}{1000}$
18.  $\frac{8}{1000}$

Write the following in expanded notation.

19. 78 925
20. 800 723

Write the following as a product of prime factors.

21. 18
22. 120
23. 84
24. 105

Identify which are divisible by 3 and which are divisible by 4 (or by both 3 and 4).

25. 66
26. 88
27. 321
28. 156

29. 920 students attended the area music night. Tickets cost \$1.75.  
How much money was collected for tickets?
30. Sergio saved \$2.30 per week from his allowance. For how many weeks  
would he have to save to purchase a mini-computer game that costs  
\$39.10, including sales tax?



# Chapter 7

# Fractions

Addition and Subtraction  
Multiplication and Division  
Decimals



# Fractions



A



B



C

Shape	Number of Equal Parts (denominator)	Shaded Parts (numerator)	Fraction Shaded
A	10	7	$\frac{7}{10}$
B	12	5	$\frac{5}{12}$
C	8	3	$\frac{3}{8}$

The **numerator** states the number of equal parts selected.  
The **denominator** states the number of equal parts in the whole (or group).

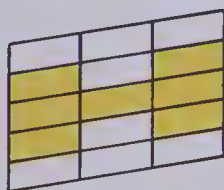
## Exercises

Copy and complete the chart.

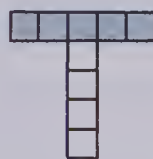
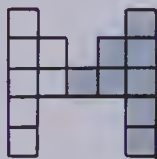
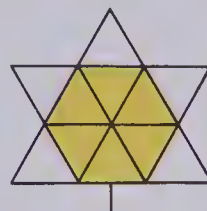
D



E

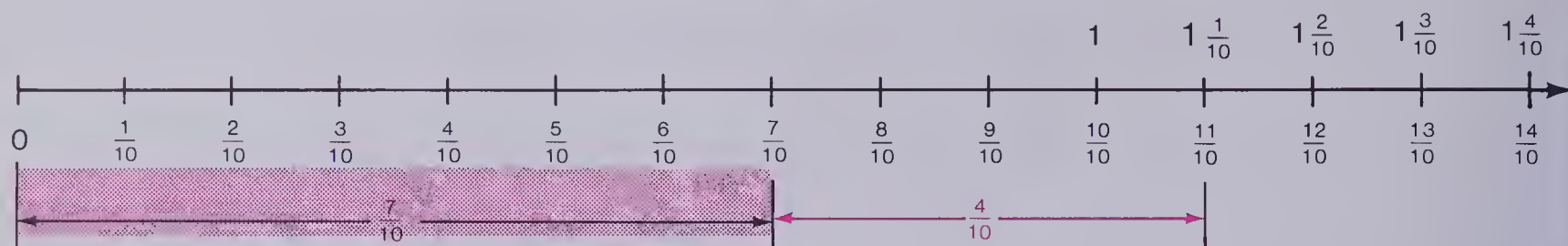


F

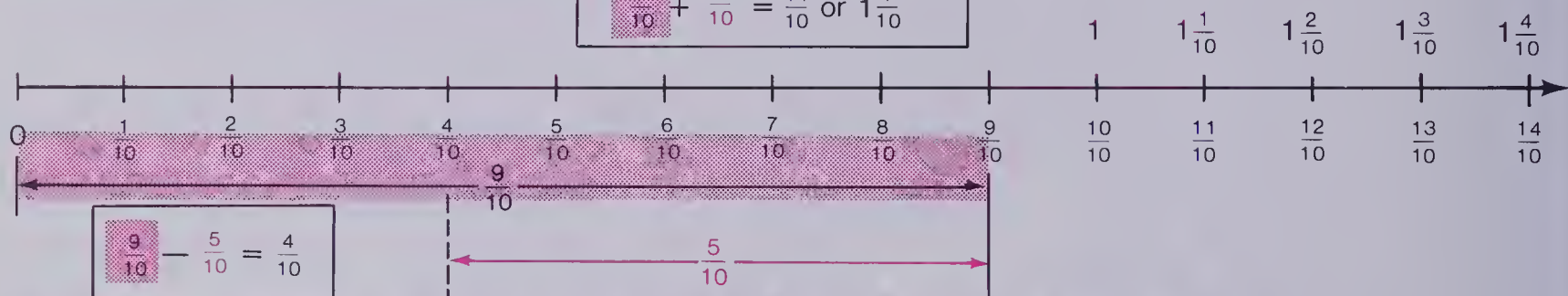


Shape	Number of Equal Parts	Fraction Shaded	Fraction White
D			
E			
F			
M			
A			
T			
H			

# Number Lines and Fractions



$$\frac{7}{10} + \frac{4}{10} = \frac{11}{10} \text{ or } 1\frac{1}{10}$$



**Like fractions** have the same denominators.  $\frac{7}{10}$  and  $\frac{4}{10}$  are **like fractions**.

## Exercises

Add.

1.  $\frac{3}{10} + \frac{4}{10}$

2.  $\frac{6}{10} + \frac{2}{10}$

3.  $\frac{5}{10} + \frac{5}{10}$

4.  $\frac{7}{10} + \frac{5}{10}$

5.  $\frac{9}{10} + \frac{6}{10}$

6.  $\frac{2}{10} + \frac{9}{10}$

7.  $\frac{3}{10} + \frac{4}{10}$

8.  $\frac{8}{10} + \frac{5}{10}$

Subtract.

9.  $\frac{3}{10} - \frac{2}{10}$

10.  $\frac{9}{10} - \frac{5}{10}$

11.  $\frac{11}{10} - \frac{4}{10}$

12.  $\frac{12}{10} - \frac{3}{10}$

13.  $\frac{13}{10} - \frac{7}{10}$

14.  $\frac{10}{10} - \frac{3}{10}$

Calculate.

15.  $1\frac{1}{10} - \frac{5}{10}$

16.  $1\frac{2}{10} - \frac{4}{10}$

17.  $1\frac{2}{10} - \frac{7}{10}$

18.  $1\frac{3}{10} - \frac{9}{10}$

19.  $1\frac{4}{10} - \frac{8}{10}$

20.  $1\frac{4}{10} - 1$

★ 21.  $\frac{7}{10} - \frac{4}{10}$

★ 22.  $\frac{8}{10} - \frac{2}{10}$

★ 23.  $\frac{9}{10} - \frac{1}{10} - \frac{2}{10} - \frac{3}{10}$

★ 24.  $\frac{9}{10} - \frac{3}{10} + \frac{1}{10} - \frac{5}{10} + \frac{2}{10}$



# Like Fractions

Add.



$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$

$$\frac{7}{8}$$

$$+ \frac{2}{8}$$

$$\frac{9}{8} \text{ or } 1\frac{1}{8}$$

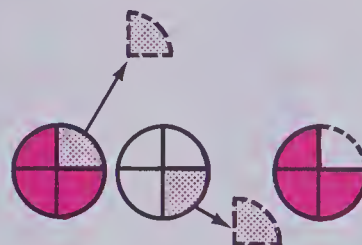
Think

$$\frac{9}{8} = 1\frac{1}{8} + \frac{1}{8}$$

**Improper fractions** have a numerator greater than the denominator:

$$\frac{7}{4} \quad \frac{11}{6} \quad \frac{9}{8} \quad \frac{13}{10}$$

Subtract.



$$\frac{5}{4} - \frac{2}{4} = \frac{3}{4}$$

$$\begin{array}{r} \frac{5}{6} \\ - \frac{1}{6} \\ \hline \frac{4}{6} \end{array}$$

**Proper fractions** have a numerator less than the denominator:

$$\frac{3}{4} \quad \frac{5}{6} \quad \frac{7}{8} \quad \frac{9}{10}$$

## Exercises

Add.

1.  $\frac{1}{2} + \frac{1}{2}$

2.  $\frac{1}{3} + \frac{2}{3}$

3.  $\frac{1}{4} + \frac{1}{4}$

4.  $\frac{1}{4} + \frac{2}{4}$

5.  $\frac{1}{5} + \frac{2}{5}$

6.  $\frac{3}{8} + \frac{4}{8}$

7.  $\frac{5}{8} + \frac{1}{8}$

8.  $\frac{3}{4} + \frac{1}{4}$

9.  $\frac{3}{5} + \frac{3}{5}$

10.  $\frac{4}{6} + \frac{1}{6}$

11.  $\frac{5}{6} + \frac{3}{6}$

12.  $\frac{7}{8} + \frac{6}{8}$

13.  $\frac{3}{8} + \frac{5}{8}$

14.  $\frac{6}{10} + \frac{7}{10}$

15.  $\frac{4}{5} + \frac{4}{5}$

Subtract.

16.  $\frac{2}{3} - \frac{1}{3}$

17.  $\frac{3}{4} - \frac{1}{4}$

18.  $\frac{3}{5} - \frac{1}{5}$

19.  $\frac{5}{6} - \frac{2}{6}$

20.  $\frac{7}{8} - \frac{2}{8}$

21.  $\frac{3}{2} - \frac{1}{2}$

22.  $\frac{5}{3} - \frac{2}{3}$

23.  $\frac{7}{5} - \frac{4}{5}$

24.  $\frac{8}{6} - \frac{5}{6}$

25.  $\frac{10}{8} - \frac{3}{8}$

26.  $\frac{7}{10} - \frac{1}{10}$

27.  $\frac{5}{4} - \frac{3}{4}$

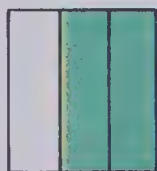
28.  $\frac{7}{6} - \frac{4}{6}$

29.  $\frac{13}{8} - \frac{6}{8}$

30.  $\frac{13}{10} - \frac{7}{10}$

# Equivalent Fractions

2 shaded



3 equal  
parts

$$\frac{2}{3}$$

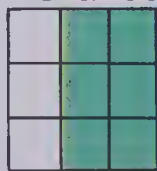
4 shaded



6 equal  
parts

$$\frac{4}{6}$$

6 shaded



9 equal  
parts

$$\frac{6}{9}$$

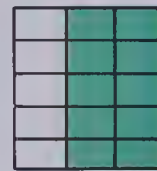
8 shaded



12 equal  
parts

$$\frac{8}{12}$$

10 shaded



15 equal  
parts

$$\frac{10}{15}$$

$$\frac{2 \times \boxed{2}}{3 \times \boxed{2}} = \frac{4}{6}$$

$$\frac{2 \times \boxed{3}}{3 \times \boxed{3}} = \frac{6}{9}$$

$$\frac{2 \times \boxed{4}}{3 \times \boxed{4}} = \frac{8}{12}$$

$$\frac{2 \times \boxed{5}}{3 \times \boxed{5}} = \frac{10}{15}$$

## Exercises

Copy and complete to make equivalent fractions.

1.  $\frac{3 \times 2}{4 \times 2} = \frac{\blacksquare}{\blacksquare}$

2.  $\frac{3 \times 3}{4 \times 3} = \frac{\blacksquare}{\blacksquare}$

3.  $\frac{3 \times 4}{4 \times 4} = \frac{\blacksquare}{\blacksquare}$

4.  $\frac{4 \times 2}{5 \times 2} = \frac{\blacksquare}{\blacksquare}$

5.  $\frac{4 \times 3}{5 \times 3} = \frac{\blacksquare}{\blacksquare}$

6.  $\frac{4 \times 4}{5 \times 4} = \frac{\blacksquare}{\blacksquare}$

7.  $\frac{2}{3} = \frac{2 \times \blacksquare}{3 \times \blacksquare} = \frac{\blacksquare}{12}$

8.  $\frac{1}{4} = \frac{1 \times \blacksquare}{4 \times \blacksquare} = \frac{\blacksquare}{20}$

9.  $\frac{3}{8} = \frac{3 \times \blacksquare}{8 \times \blacksquare} = \frac{\blacksquare}{24}$

10.  $\frac{3}{10} = \frac{3 \times \blacksquare}{10 \times \blacksquare} = \frac{\blacksquare}{60}$

11.  $\frac{5}{6} = \frac{5 \times \blacksquare}{6 \times \blacksquare} = \frac{\blacksquare}{24}$

12.  $\frac{7}{8} = \frac{7 \times \blacksquare}{8 \times \blacksquare} = \frac{\blacksquare}{40}$

13.  $\frac{3}{2} = \frac{3 \times \blacksquare}{2 \times \blacksquare} = \frac{\blacksquare}{12}$

14.  $\frac{4}{3} = \frac{4 \times \blacksquare}{3 \times \blacksquare} = \frac{\blacksquare}{21}$

15.  $\frac{13}{10} = \frac{13 \times \blacksquare}{10 \times \blacksquare} = \frac{\blacksquare}{20}$

16. Write 3 equivalent fractions for each.

(a)  $\frac{3}{5}$

(b)  $\frac{1}{6}$

(c)  $\frac{7}{10}$

★ (d)  $\frac{11}{12}$

# Fractions in Lowest Terms

Many fractions can be written in lowest terms.

Divide  
the numerator and  
denominator by a  
common factor.

$$\frac{2}{6} \text{ in lowest terms is } \frac{1}{3} . \text{ Why? } \frac{2 \div 2}{6 \div 2} = \boxed{\frac{1}{3}}$$

$$\frac{6}{15} \text{ in lowest terms is } \frac{2}{5} . \text{ Why? } \frac{6 \div 3}{15 \div 3} = \boxed{\frac{2}{5}}$$

A fraction is in **lowest terms** if the only factor common to both numerator and denominator is 1.

## Exercises

Express these fractions in lowest terms.

1.  $\frac{5}{10} = \frac{5 \div \blacksquare}{10 \div \blacksquare}$   
 $= \frac{\blacksquare}{\blacksquare}$

2.  $\frac{4}{6} = \frac{4 \div \blacksquare}{6 \div \blacksquare}$   
 $= \frac{\blacksquare}{\blacksquare}$

3.  $\frac{2}{8} = \frac{2 \div \blacksquare}{8 \div \blacksquare}$   
 $= \frac{\blacksquare}{\blacksquare}$

4.  $\frac{6}{18} = \frac{6 \div \blacksquare}{18 \div \blacksquare}$   
 $= \frac{\blacksquare}{\blacksquare}$

5.  $\frac{9}{12}$

6.  $\frac{7}{21}$

7.  $\frac{10}{25}$

8.  $\frac{12}{15}$

9.  $\frac{8}{10}$

10.  $\frac{8}{20}$

11.  $\frac{4}{18}$

12.  $\frac{12}{21}$

13.  $\frac{6}{9}$

14.  $\frac{9}{15}$

15.  $\frac{4}{14}$

16.  $\frac{6}{21}$

17.  $\frac{12}{16}$

18.  $\frac{10}{15}$

19.  $\frac{8}{24}$

20.  $\frac{15}{25}$

21.  $\frac{20}{50}$

22.  $\frac{16}{35}$

23.  $\frac{10}{16}$

24.  $\frac{18}{27}$

## BRAINTICKLER

Solve and look for a pattern.

$$\frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \boxed{\frac{1}{3}}$$

$$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} = \frac{6}{24} = \blacksquare$$

$$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} = \frac{24}{120} = \blacksquare$$

$$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} = \blacksquare$$

Remember:  
Reduce to  
lowest  
terms.

Use a pattern to predict the answers.

$$\frac{1}{2} \times \frac{2}{3} \times \dots \times \frac{7}{8} = \blacksquare$$

$$\frac{1}{2} \times \frac{2}{3} \times \dots \times \frac{9}{10} = \blacksquare$$

$$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \dots \times \frac{19}{20} = \blacksquare$$

$$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \dots \times \frac{99}{100} = \blacksquare$$



# The Show

Anita is a game-show winner.  
She has to choose a prize:

either

$\frac{2}{3}$  of her mass in silver coins

or

$\frac{3}{4}$  of her mass in silver coins.

Which should she choose?

Compare these fractions:  $\frac{2}{3}$  and  $\frac{3}{4}$ .

Change both fractions to twelfths:

$$\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

$$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

Since  $\frac{9}{12}$  is greater than  $\frac{8}{12}$

then  $\frac{3}{4}$  is greater than  $\frac{2}{3}$ .



Anita should choose  $\frac{3}{4}$  of her mass in silver dollars.

## Exercises

Compare these fractions. (Use  $>$ ,  $<$ , or  $=$ .)

1.  $\frac{2}{3}$  and  $\frac{4}{5}$

$$\frac{2}{3} = \frac{2 \times 5}{3 \times 5} = \frac{10}{15}$$

$$\frac{4}{5} = \frac{4 \times 3}{5 \times 3} = \frac{12}{15}$$

$$\frac{2}{3} \bullet \frac{4}{5}$$

2.  $\frac{1}{4}$  and  $\frac{1}{5}$

$$\frac{1}{4} = \frac{1 \times 5}{4 \times 5} = \frac{5}{20}$$

$$\frac{1}{5} = \frac{1 \times 4}{5 \times 4} = \frac{4}{20}$$

$$\frac{1}{4} \bullet \frac{1}{5}$$

3.  $\frac{1}{3}$  and  $\frac{2}{6}$

$$\frac{1}{3} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6}$$

$$\frac{2}{6} = \frac{2}{6}$$

$$\frac{1}{3} \bullet \frac{2}{6}$$

4.  $\frac{7}{8}$  and  $\frac{2}{3}$     5.  $\frac{7}{10}$  and  $\frac{3}{4}$     6.  $\frac{2}{5}$  and  $\frac{3}{8}$     7.  $\frac{3}{4}$  and  $\frac{5}{6}$     8.  $\frac{1}{4}$  and  $\frac{3}{12}$     9.  $\frac{1}{3}$  and  $\frac{3}{10}$

Which is larger? (Use  $>$ .)

10.  $\frac{2}{3}$  or  $\frac{6}{10}$     11.  $\frac{7}{15}$  or  $\frac{1}{2}$     12.  $\frac{3}{5}$  or  $\frac{7}{12}$

Which is smaller? (Use  $<$ .)

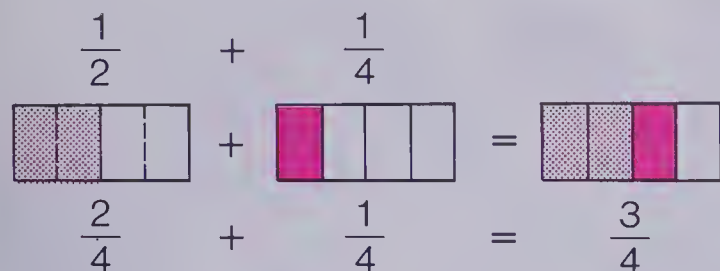
13.  $\frac{4}{5}$  or  $\frac{5}{6}$     14.  $\frac{3}{8}$  or  $\frac{1}{3}$     15.  $\frac{9}{10}$  or  $\frac{8}{9}$

★16. Arrange these fractions in order from smallest to largest.

(a)  $\frac{2}{3}, \frac{5}{6}, \frac{3}{4}, \frac{7}{10}$

(b)  $\frac{1}{4}, \frac{7}{10}, \frac{3}{8}, \frac{3}{5}$

# Adding and Subtracting Fractions



Addition

$$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

$$+ \frac{1}{4} = \frac{1}{4}$$


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$$\frac{3}{4}$$

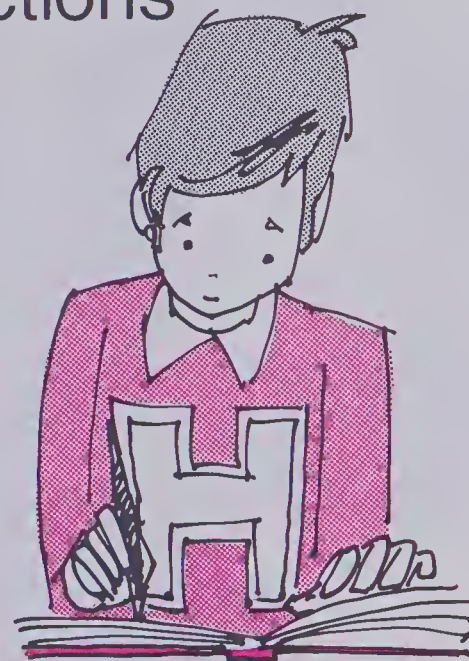
Subtraction

$$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

$$- \frac{1}{4} = \frac{1}{4} \text{ (Subtract)}$$


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$$\frac{1}{4}$$



Exercises  
Calculate.

1.  $\frac{1}{5} = \frac{1 \times 2}{5 \times 2} = \frac{\blacksquare}{\blacksquare}$

$$+ \frac{1}{10} = \frac{1}{10}$$


---


$$\frac{\blacksquare}{10}$$

2.  $\frac{1}{3} = \frac{1 \times \blacksquare}{3 \times \blacksquare} = \frac{\blacksquare}{\blacksquare}$

$$+ \frac{1}{6} = \frac{1}{6}$$


---


$$\frac{\blacksquare}{6}$$

3.  $\frac{2}{3} = \frac{2 \times \blacksquare}{3 \times \blacksquare} = \frac{\blacksquare}{\blacksquare}$

$$+ \frac{2}{9} = \frac{\blacksquare}{9}$$


---


$$\frac{\blacksquare}{9}$$

4.  $\frac{1}{6} + \frac{1}{2}$

---

5.  $\frac{1}{4} + \frac{3}{8}$

---

6.  $\frac{2}{5} + \frac{3}{10}$

---

7.  $\frac{1}{3} + \frac{5}{9}$

---

8.  $\frac{1}{10} + \frac{1}{2}$

---

Find the differences.

9.  $\frac{4}{5} = \frac{4 \times 2}{5 \times 2} = \frac{\blacksquare}{10}$

$$- \frac{3}{10} = \frac{3}{10}$$


---


$$\frac{\blacksquare}{10}$$

10.  $\frac{2}{3} = \frac{2 \times \blacksquare}{3 \times \blacksquare} = \frac{\blacksquare}{9}$

$$- \frac{2}{9} = \frac{2}{9}$$


---


$$\frac{\blacksquare}{9}$$

11.  $\frac{3}{4} = \frac{3 \times \blacksquare}{4 \times \blacksquare} = \frac{\blacksquare}{\blacksquare}$

$$- \frac{5}{8} = \frac{5}{8}$$


---


$$\frac{\blacksquare}{8}$$

12.  $\frac{8}{9} - \frac{1}{3}$

---

13.  $\frac{4}{5} - \frac{1}{10}$

---

14.  $\frac{3}{4} - \frac{1}{8}$

---

15.  $\frac{5}{6} - \frac{1}{2}$

---

16.  $\frac{14}{15} - \frac{1}{3}$

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# Fraction "Golf"

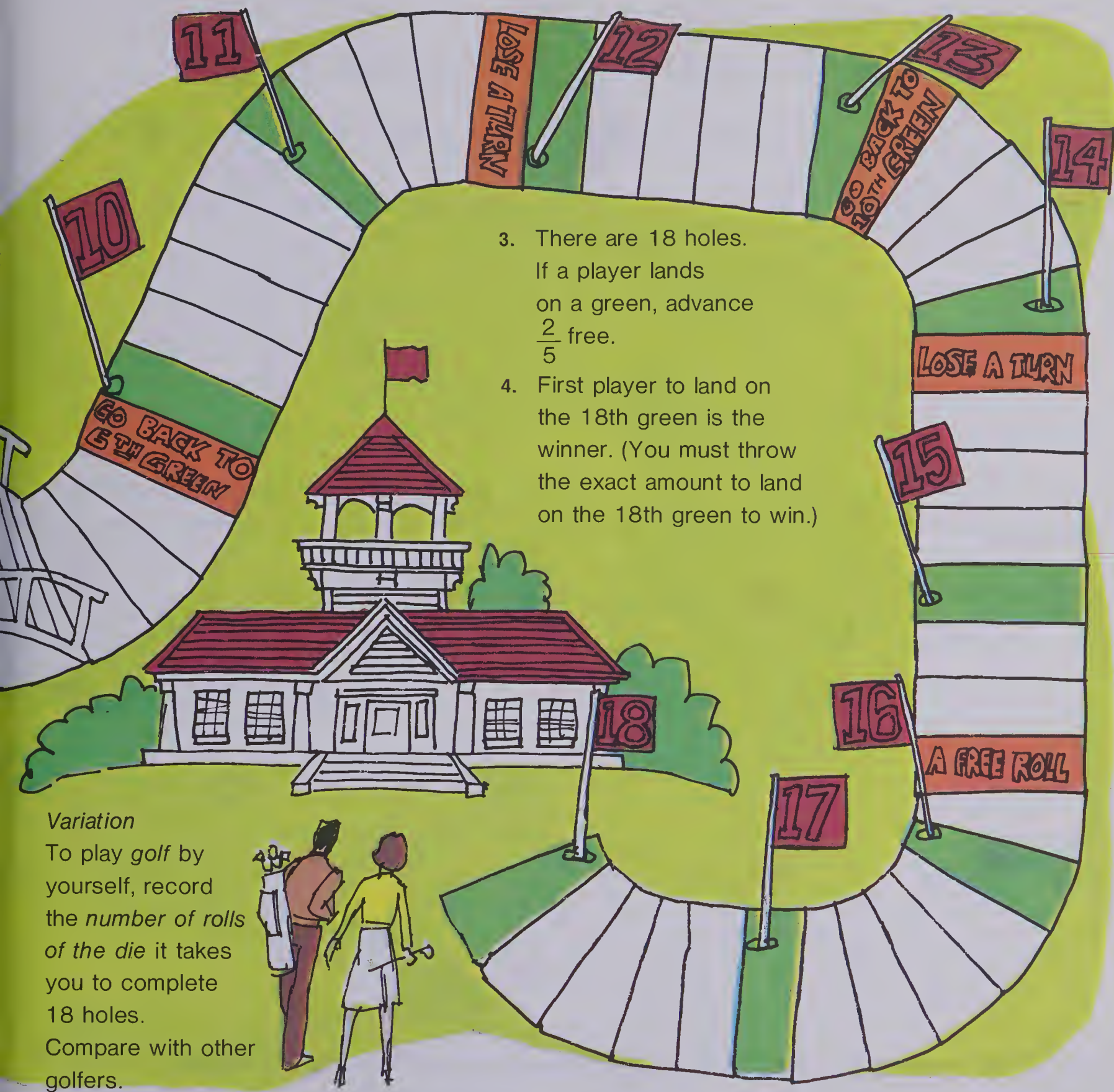
Use this pattern to make a die.

	$\frac{4}{5}$	
	0	
$\frac{2}{5}$	$\frac{1}{5}$	$\frac{3}{5}$
	1	

1. First player rolls die to see how far to advance.
2. Repeat for each player.







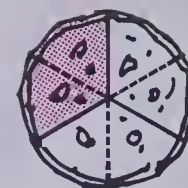
# Pizzas

Derek ate  $\frac{1}{2}$  of one pizza.

Keith ate  $\frac{1}{3}$  of another pizza.



$$\frac{1}{2} = \frac{3}{6}$$



$$\frac{1}{3} = \frac{2}{6}$$

(a) How much pizza did the two boys eat altogether?

$$\begin{array}{r} \frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6} \\ + \frac{1}{3} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6} \\ \hline \frac{5}{6} \end{array}$$

They ate  $\frac{5}{6}$  of a pizza.

(b) How much more pizza did Derek eat than Keith?

$$\begin{array}{r} \frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6} \\ - \frac{1}{3} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6} \\ \hline \frac{1}{6} \end{array}$$

Derek ate  $\frac{1}{6}$  of a pizza more than Keith.

## Exercises

Find the sums.

1.  $\frac{3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{\blacksquare}{20}$   
 $+ \frac{2}{5} = \frac{2 \times 4}{5 \times 4} = \frac{\blacksquare}{20}$   
 $\hline \frac{\blacksquare}{20}$

2.  $\frac{3}{5} = \frac{3 \times \blacksquare}{5 \times \blacksquare} = \frac{\blacksquare}{15}$   
 $+ \frac{2}{3} = \frac{2 \times \blacksquare}{3 \times \blacksquare} = \frac{\blacksquare}{15}$   
 $\hline \frac{\blacksquare}{15}$

3.  $\frac{5}{8} = \frac{5 \times \blacksquare}{8 \times \blacksquare} = \frac{\blacksquare}{\blacksquare}$   
 $+ \frac{2}{5} = \frac{2 \times \blacksquare}{5 \times \blacksquare} = \frac{\blacksquare}{\blacksquare}$   
 $\hline \frac{\blacksquare}{\blacksquare}$

4.  $\frac{3}{5} + \frac{3}{4}$   
 $\hline$

5.  $\frac{1}{8} + \frac{2}{3}$   
 $\hline$

6.  $\frac{1}{4} + \frac{3}{5}$   
 $\hline$

7.  $\frac{9}{10} + \frac{1}{3}$   
 $\hline$

8.  $\frac{3}{4} + \frac{1}{5}$   
 $\hline$

9.  $\frac{5}{8} + \frac{1}{3}$   
 $\hline$

10.  $\frac{5}{4} + \frac{3}{5}$   
 $\hline$

Calculate.

11.  $\frac{2}{3} - \frac{1}{4}$   
 $\hline$

12.  $\frac{7}{8} - \frac{3}{5}$   
 $\hline$

13.  $\frac{7}{10} - \frac{2}{3}$   
 $\hline$

14.  $\frac{3}{4} - \frac{1}{3}$   
 $\hline$

15.  $\frac{4}{5} - \frac{3}{4}$   
 $\hline$

16.  $\frac{5}{8} - \frac{1}{3}$   
 $\hline$

17.  $\frac{13}{10} - \frac{3}{4}$   
 $\hline$

18.  $\frac{8}{5} - \frac{2}{3}$   
 $\hline$

19.  $\frac{3}{10} - \frac{1}{4}$   
 $\hline$

20.  $\frac{5}{8} - \frac{1}{3}$   
 $\hline$

★ 21.  $\frac{1}{2} + \frac{1}{4} + \frac{1}{5}$

★ 22.  $\frac{2}{3} + \frac{1}{2} + \frac{7}{10}$

★ 23.  $\frac{14}{15} - \frac{3}{10}$

★ 24.  $\frac{1}{9} - \frac{1}{11}$

# Using Least Common Denominators

Often a common denominator is a multiple of the *larger* denominator.

$$\frac{3}{4} = \frac{9}{12}$$

$$+ \frac{1}{12} = \frac{1}{12}$$

$$\frac{10}{12} \text{ or } \frac{5}{6}$$

The least common denominator is 12.

$$\frac{9}{10} = \frac{18}{20}$$

$$- \frac{3}{4} = \frac{15}{20}$$

$$\frac{3}{20}$$

The least common denominator is 20.

$$\frac{13}{15} = \frac{26}{30}$$

$$- \frac{1}{6} = \frac{5}{30}$$

$$\frac{21}{30} \text{ or } \frac{7}{10}$$

The least common denominator is 30.

## Exercises

Add or subtract.

Use least common denominators.

1.  $\frac{1}{4} = \frac{\blacksquare}{20}$   
 $+ \frac{7}{10} = \frac{\blacksquare}{20}$

2.  $\frac{5}{6} = \frac{5}{6}$   
 $- \frac{1}{2} = \frac{\blacksquare}{6}$

3.  $\frac{7}{6} = \frac{\blacksquare}{12}$   
 $- \frac{3}{4} = \frac{\blacksquare}{12}$

4.  $\frac{7}{8}$   
 $- \frac{7}{10}$

5.  $\frac{1}{2}$   
 $- \frac{1}{8}$

6.  $\frac{7}{10}$   
 $- \frac{1}{6}$

7.  $\frac{3}{4}$   
 $+ \frac{7}{8}$

8.  $\frac{11}{15}$   
 $+ \frac{5}{6}$

9.  $\frac{11}{10}$   
 $- \frac{3}{4}$

10.  $\frac{2}{5}$   
 $+ \frac{4}{15}$

11.  $\frac{9}{8}$   
 $- \frac{7}{12}$

12.  $\frac{3}{4}$   
 $+ \frac{9}{10}$

13.  $\frac{5}{6}$   
 $+ \frac{3}{4}$

14.  $\frac{3}{16}$   
 $+ \frac{5}{8}$

15.  $\frac{11}{12}$   
 $- \frac{3}{8}$

16. Carol is making a suit. She needs  $\frac{7}{8}$  m of fabric for the jacket and  $\frac{7}{10}$  m for the skirt. How much fabric must she purchase?



# Properties of Addition of Fractions

Compare:

$$(a) \quad \frac{1}{2} + \frac{3}{4} = \frac{2}{4} + \frac{3}{4}$$

$$= \frac{5}{4} = \boxed{1\frac{1}{4}}$$

$$(b) \quad \frac{3}{4} + \frac{1}{2} = \frac{3}{4} + \frac{2}{4}$$

$$= \frac{5}{4} = \boxed{1\frac{1}{4}}$$

Compare

What is the rule?

Compare:

$$(a) \quad \left(\frac{1}{2} + \frac{1}{3}\right) + \frac{1}{3} = \left(\frac{3}{6} + \frac{2}{6}\right) + \frac{1}{3}$$

$$= \frac{5}{6} + \frac{2}{6}$$

$$= \frac{7}{6} = \boxed{1\frac{1}{6}}$$

$$(b) \quad \frac{1}{2} + \left(\frac{1}{3} + \frac{1}{3}\right) = \frac{1}{2} + \frac{2}{3}$$

$$= \frac{3}{6} + \frac{4}{6}$$

$$= \frac{7}{6} = \boxed{1\frac{1}{6}}$$

Compare

What is the rule?

## Exercises

Add each pair of questions and compare the answers. Write a rule.

$$1. (a) \quad \frac{1}{8} + \frac{1}{4}$$

$$2. (a) \quad \frac{3}{4} + \frac{2}{5}$$

$$3. (a) \quad \frac{5}{8} + \frac{1}{3}$$

$$4. (a) \quad \frac{2}{3} + \frac{3}{10}$$

$$(b) \quad \frac{1}{4} + \frac{1}{8}$$

$$(b) \quad \frac{2}{5} + \frac{3}{4}$$

$$(b) \quad \frac{1}{3} + \frac{5}{8}$$

$$(b) \quad \frac{3}{10} + \frac{2}{3}$$

Add each pair of questions and compare the answers. Write a rule.

$$5. (a) \quad \left(\frac{1}{8} + \frac{1}{8}\right) + \frac{1}{4}$$

$$6. (a) \quad \left(\frac{1}{2} + \frac{1}{4}\right) + \frac{1}{4}$$

$$7. (a) \quad \left(\frac{1}{4} + \frac{1}{6}\right) + \frac{1}{4}$$

$$8. (a) \quad \left(\frac{2}{5} + \frac{1}{6}\right) + \frac{3}{5}$$

$$(b) \quad \frac{1}{8} + \left(\frac{1}{8} + \frac{1}{4}\right)$$

$$(b) \quad \frac{1}{2} + \left(\frac{1}{4} + \frac{1}{4}\right)$$

$$(b) \quad \frac{1}{4} + \left(\frac{1}{6} + \frac{1}{4}\right)$$

$$(b) \quad \frac{2}{5} + \left(\frac{1}{6} + \frac{3}{5}\right)$$

- ★ 9. What happens if you try these rules with subtraction? Do you get the same answers in these pairs of questions?

$$(a) \quad \frac{1}{2} - \frac{1}{4}$$

$$(b) \quad \frac{1}{4} - \frac{1}{2}$$

$$(a) \quad \left(\frac{7}{10} - \frac{1}{5}\right) - \frac{1}{10}$$

$$(b) \quad \frac{7}{10} - \left(\frac{1}{5} - \frac{1}{10}\right)$$

## Activity

Make this set of cards.

$\frac{1}{2}$	$\frac{5}{8}$	$\frac{2}{5}$	$\frac{3}{10}$	$\frac{7}{12}$	$\frac{3}{4}$	$\frac{5}{4}$	$\frac{5}{6}$	
$\frac{3}{8}$	$\frac{7}{10}$	$\frac{1}{4}$	$\frac{5}{12}$	$\frac{7}{5}$	$\frac{3}{5}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{11}{8}$

- Select 2 fraction cards. Add these fractions.
- Make up 5 addition questions this way. Solve.
- Make up 5 subtraction questions in a similar way. Solve.

# Mixed Numerals

To change an improper fraction into a **mixed numeral**:

Divide the numerator by the denominator.

Improper fraction:



Divide:

$$\begin{array}{r} 2 \\ 3 \overline{)7} \\ \underline{6} \\ 1 \end{array}$$

$$\begin{array}{r} 3 \\ 5 \overline{)19} \\ \underline{15} \\ 4 \end{array}$$

Mixed numeral:



The remainder becomes the numerator of the fraction.

$\frac{19}{5}$

To change a *mixed numeral* into an improper fraction:

Multiply the whole number by the denominator. Then add the numerator.

Mixed numeral:



Multiply and add:

$$3 \times 4 + 1 = 13$$

Keep the same denominator.

Improper fraction:



## Exercises

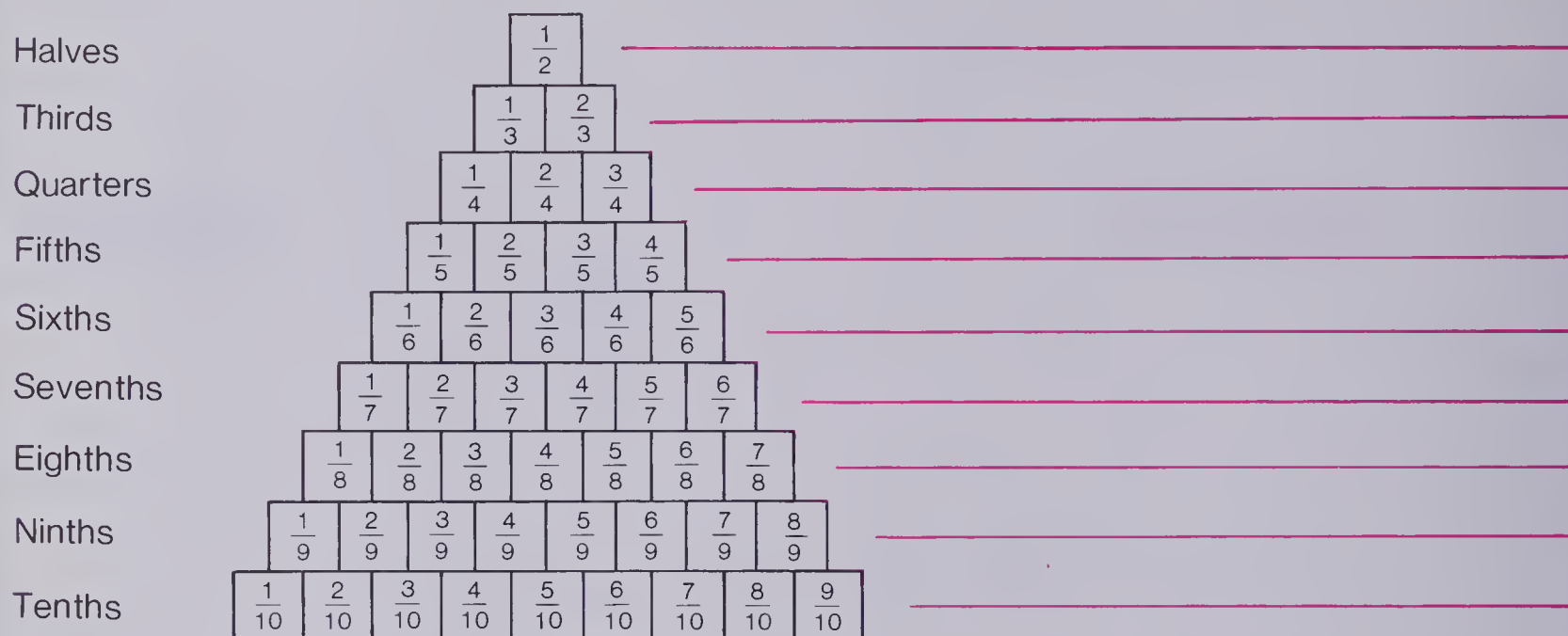
Change each to an equivalent mixed numeral.

- |                   |                    |                    |                     |                    |                    |                    |                   |
|-------------------|--------------------|--------------------|---------------------|--------------------|--------------------|--------------------|-------------------|
| 1. $\frac{5}{2}$  | 2. $\frac{5}{3}$   | 3. $\frac{7}{4}$   | 4. $\frac{9}{5}$    | 5. $\frac{11}{8}$  | 6. $\frac{17}{10}$ | 7. $\frac{11}{2}$  | 8. $\frac{20}{3}$ |
| 9. $\frac{23}{4}$ | 10. $\frac{33}{5}$ | 11. $\frac{51}{8}$ | 12. $\frac{73}{10}$ | 13. $\frac{65}{3}$ | 14. $\frac{47}{4}$ | 15. $\frac{78}{5}$ |                   |

Change each to an equivalent improper fraction.

- |                    |                    |                     |                    |                     |
|--------------------|--------------------|---------------------|--------------------|---------------------|
| 16. $3\frac{1}{2}$ | 17. $1\frac{3}{4}$ | 18. $1\frac{5}{8}$  | 19. $2\frac{1}{3}$ | 20. $1\frac{7}{10}$ |
| 21. $2\frac{3}{5}$ | 22. $5\frac{2}{3}$ | 23. $4\frac{1}{4}$  | 24. $3\frac{7}{8}$ | 25. $5\frac{9}{10}$ |
| 26. $7\frac{1}{3}$ | 27. $8\frac{2}{5}$ | 28. $12\frac{1}{2}$ | 29. $9\frac{3}{4}$ | 30. $5\frac{3}{8}$  |

# Fraction Towers



Copy this Fraction Tower into your notebook.

1. Colour groups of equivalent fractions the same colour.
2. Which row has no fractions equivalent to another fraction in the chart?
3. Which equivalent fractions are lined up vertically?
4. Use different coloured pairs of fractions from different levels of the Fraction Tower.
  - (a) Make up 5 addition questions and solve them.
  - (b) Make up 5 subtraction questions and solve them.

(Pick the first fraction from the right side of the tower. Choose the second fraction from those that are to the left of the first fraction. For Example:  $\frac{5}{6}$  is from the right side of the tower.  $\frac{3}{8}$  is to the left of  $\frac{5}{6}$ .)

$$\begin{array}{r}
 \frac{5}{6} = \frac{20}{24} \\
 - \frac{3}{8} = \frac{9}{24} \\
 \hline
 \frac{11}{24}
 \end{array}$$



# Fraction-Tower Sums

→	$\frac{1}{2}$	
→	$\frac{1}{3} + \frac{2}{3} =$	■
→	$\frac{1}{4} + \frac{2}{4} + \frac{3}{4} =$	■
→	$\frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} =$	■
→	$\frac{1}{6} + \frac{2}{6} + \frac{3}{6} + \frac{4}{6} + \frac{5}{6} =$	■
→	$\frac{1}{7} + \frac{2}{7} + \frac{3}{7} + \frac{4}{7} + \frac{5}{7} + \frac{6}{7} =$	■
→	$\frac{1}{8} + \frac{2}{8} + \frac{3}{8} + \frac{4}{8} + \frac{5}{8} + \frac{6}{8} + \frac{7}{8} =$	■
→	$\frac{1}{9} + \frac{2}{9} + \frac{3}{9} + \frac{4}{9} + \frac{5}{9} + \frac{6}{9} + \frac{7}{9} + \frac{8}{9} =$	■
→	$\frac{1}{10} + \frac{2}{10} + \frac{3}{10} + \frac{4}{10} + \frac{5}{10} + \frac{6}{10} + \frac{7}{10} + \frac{8}{10} + \frac{9}{10} =$	■

- Copy and calculate the sum of each row in the fraction tower above. Express answers as mixed numerals.
- What pattern do you notice in the answers? Explain this pattern.
- Without adding, predict the answers to the following.

(a)  $\frac{1}{11} + \frac{2}{11} + \dots + \frac{10}{11} =$  ■      (b)  $\frac{1}{12} + \frac{2}{12} + \dots + \frac{11}{12} =$  ■

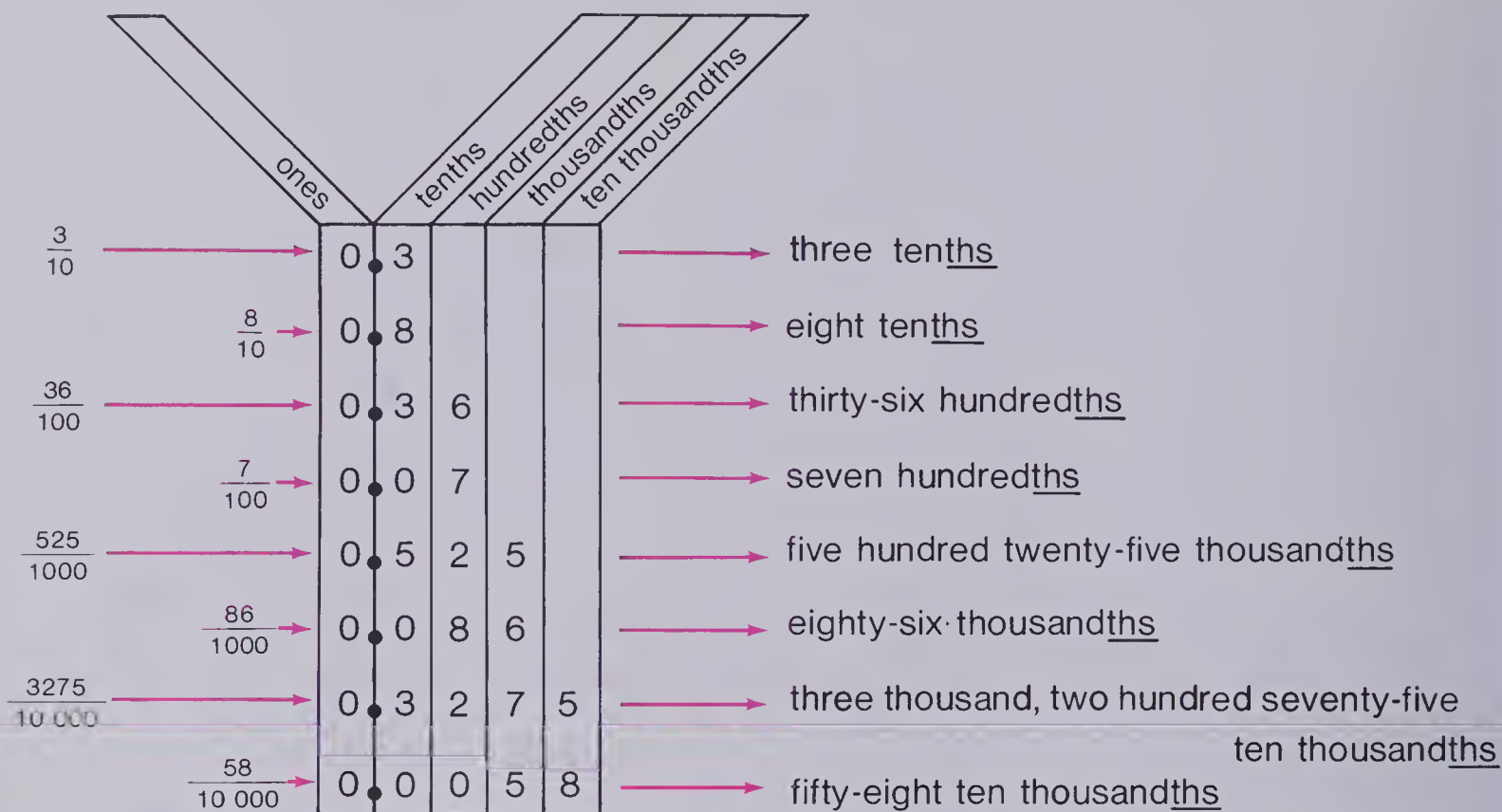
(c)  $\frac{1}{13} + \frac{2}{13} + \dots + \frac{12}{13} =$  ■      (d)  $\frac{1}{14} + \frac{2}{14} + \dots + \frac{13}{14} =$  ■

(e)  $\frac{1}{15} + \frac{2}{15} + \dots + \frac{14}{15} =$  ■

- (f) Check your predictions by adding.



# Decimal Equivalence



## Exercises

Express each as a decimal fraction.

1.  $\frac{5}{10}$
2.  $\frac{9}{10}$
3.  $\frac{6}{10}$
4.  $\frac{10}{10}$
5.  $\frac{17}{100}$
6.  $\frac{75}{100}$
7.  $\frac{8}{100}$
8.  $\frac{1}{100}$
9.  $\frac{875}{1000}$
10.  $\frac{25}{1000}$
11.  $\frac{3}{1000}$
12.  $\frac{456}{1000}$
13.  $\frac{38}{1000}$
14.  $\frac{2}{100}$
15.  $\frac{399}{1000}$
16.  $\frac{99}{10\ 000}$
17.  $\frac{2539}{10\ 000}$
18.  $\frac{725}{10\ 000}$
19.  $\frac{65}{10\ 000}$
20.  $\frac{4}{10\ 000}$

21. seven hundred twenty-three thousandths

23. seven hundred thirteen thousandths

★ 25. one hundred two and one tenth

22. twenty-nine hundredths

24. four hundred eighty-five ten thousandths

★ 26. sixty-six and ninety-two thousandths

# Adding and Subtracting Decimals

$$0.7 + 0.3816 + 0.925 + 0.93 + 0.32148$$

Remember:  
Adding and  
subtracting decimals  
is like adding and  
subtracting whole numbers.

$$\begin{array}{r} 3 \phantom{0} 1 \phantom{0} 1 \\ 0.7 \\ 0.3816 \\ 0.925 \\ 0.93 \\ + 0.32148 \\ \hline 3.25808 \end{array}$$

$$0.93847 - 0.72546$$

$$\begin{array}{r} 0.93847 \\ - 0.72546 \\ \hline 0.21301 \end{array}$$

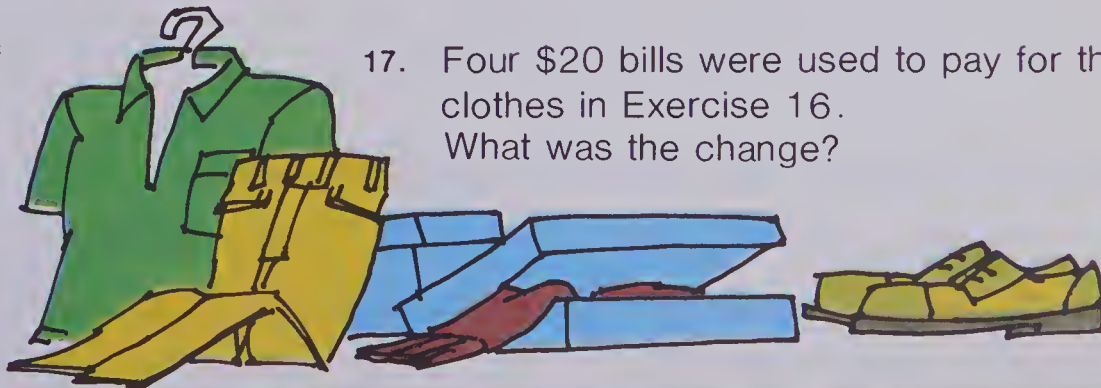
Always line up the decimal points to maintain the correct decimal-place values.

## Exercises

Solve.

1.  $0.92 + 0.71 + 0.32$
2.  $0.85 - 0.16$
3.  $0.783 + 0.123 + 0.857$
4.  $0.673 - 0.128$
5.  $0.94 + 0.5 + 0.71$
6.  $0.5371 - 0.28$
7.  $0.7 + 0.389 + 0.9513$
8.  $0.63 - 0.318$
9.  $\$16.75 + \$3.65$
10.  $\$12.93 - \$6.17$
11.  $\$52.03 + \$2.08$
12.  $\$20.15 - \$13.85$
13.  $0.63842 + 0.270547$
14.  $0.9352 - 0.2519$
- ★ 15.  $0.1235 + 0.73 + 0.82719 + 8.3451 + 0.579864 + 0.325074$
16. Calculate the total cost of new spring clothes:  

Shirt	— \$ 7.95
Jeans	— \$24.95
Socks	— \$ 3.50
Shoes	— \$18.75
Sweater	— \$16.95
17. Four \$20 bills were used to pay for the clothes in Exercise 16. What was the change?





# The Greenhouse Manager

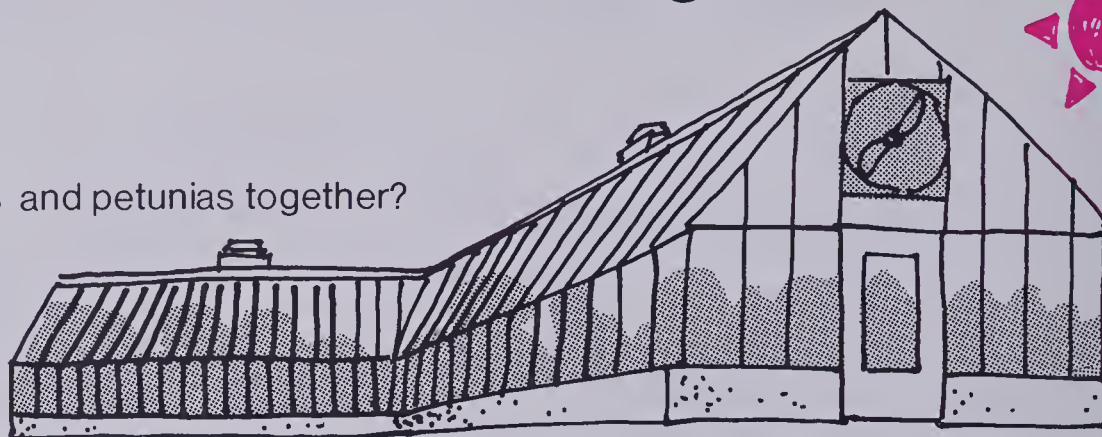


$1\frac{1}{2}$  flats of carnations.

$3\frac{2}{5}$  flats of petunias.

How many flats of carnations and petunias together?

$$\begin{array}{r} 1\frac{1}{2} \rightarrow 1\frac{5}{10} \\ + 3\frac{2}{5} \rightarrow + 3\frac{4}{10} \\ \hline 4\frac{9}{10} \end{array}$$



There are  $4\frac{9}{10}$  flats of carnations and petunias.

## Exercises

Copy and complete.

1.  $3\frac{1}{2} = 3\frac{\square}{6}$   
 $+ 1\frac{1}{3} = 1\frac{\square}{6}$   
 $\hline = \square\frac{\square}{\square}$

2.  $5\frac{4}{5} = 5\frac{\square}{10}$   
 $- 2\frac{1}{10} = 2\frac{1}{10}$   
 $\hline = \square\frac{\square}{\square}$

3.  $3\frac{2}{3} = 3\frac{\square}{15}$   
 $- 2\frac{3}{5} = 2\frac{\square}{15}$   
 $\hline = \square\frac{\square}{\square}$

4.  $2\frac{3}{4}$   
 $+ 4\frac{1}{5}$   
 $\hline$

5.  $5\frac{7}{8}$   
 $- 3\frac{1}{4}$   
 $\hline$

6.  $3\frac{3}{10}$   
 $+ 4\frac{1}{2}$   
 $\hline$

7.  $5\frac{2}{5}$   
 $- 1\frac{3}{10}$   
 $\hline$

8.  $12\frac{1}{3}$   
 $+ 7\frac{1}{4}$   
 $\hline$

9.  $18\frac{4}{5}$   
 $- 7\frac{1}{2}$   
 $\hline$

10.  $11\frac{3}{8}$   
 $+ 8\frac{1}{3}$   
 $\hline$

11.  $12\frac{4}{5}$   
 $- 6\frac{1}{3}$   
 $\hline$

12. The manager had  $3\frac{2}{5}$  rows of pink alyssum and  $2\frac{1}{4}$  rows of blue alyssum. How many rows of alyssum in all does the manager have?

13. There are  $6\frac{4}{5}$  flats of marigolds. The manager sold  $2\frac{1}{3}$  flats of marigolds. How many flats of marigolds were left?

# The Science Fair

Jennifer made a model of a volcano for the science fair. She spent  $3\frac{2}{3}$  h making the plaster model on Saturday and  $2\frac{4}{5}$  h painting it on Monday.

How much time did she spend on her project?

$$\begin{array}{r} 3\frac{2}{3} = 3\frac{10}{15} \\ + 2\frac{4}{5} = 2\frac{12}{15} \\ \hline \end{array}$$

$$5\frac{22}{15} = 6\frac{7}{15}$$

Think:

$$\begin{array}{r} 5\frac{22}{15} = 5 + 1\frac{5}{5} + \frac{7}{15} \\ = 6\frac{7}{15} \end{array}$$



Jennifer spent  $6\frac{7}{15}$  h on the project.

## Exercises

Add.

$$\begin{array}{r} 1. \quad 2\frac{1}{2} = 2\frac{2}{4} \\ + 3\frac{3}{4} = 3\frac{3}{4} \\ \hline \end{array}$$

$$\blacksquare\frac{\blacksquare}{4} = \blacksquare\frac{\blacksquare}{4}$$

$$\begin{array}{r} 2. \quad 5\frac{2}{3} = 5\frac{\blacksquare}{15} \\ + 1\frac{3}{5} = 1\frac{\blacksquare}{15} \\ \hline \end{array}$$

$$= \blacksquare\frac{\blacksquare}{15} = \blacksquare\frac{\blacksquare}{\blacksquare}$$

$$\begin{array}{r} 3. \quad 3\frac{7}{10} \\ + 5\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 2\frac{5}{8} \\ + 3\frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 7\frac{5}{6} \\ + 1\frac{2}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 2\frac{9}{10} \\ + 2\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 3\frac{5}{6} = 3\frac{\blacksquare}{12} \\ + 2\frac{1}{4} = 2\frac{\blacksquare}{12} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 2\frac{3}{10} \\ + 1\frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 4\frac{7}{8} \\ + 3\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 1\frac{7}{8} \\ + 4\frac{5}{6} \\ \hline \end{array}$$

- ★11. Duncan spent  $3\frac{1}{2}$  h on Monday,  $2\frac{2}{3}$  h on Tuesday, and  $1\frac{1}{4}$  h on Wednesday making his science-fair project.

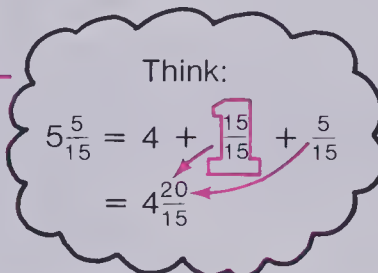
How long did he spend making his project?

# Building Models

Clover spent  $5\frac{1}{3}$  h building her model, and Stephanie spent  $3\frac{4}{5}$  h making her project. How much longer did Clover spend?

In this example, regrouping is required.

$$\begin{array}{r} 5\frac{1}{3} = 5\frac{5}{15} = 4\frac{20}{15} \\ - 3\frac{4}{5} = 3\frac{12}{15} = 3\frac{12}{15} \\ \hline 1\frac{8}{15} \end{array}$$



Clover spent  $1\frac{8}{15}$  h longer on her project.

## Exercises

Subtract. (Use regrouping when required.)

1. 
$$\begin{array}{r} 8\frac{1}{4} = 8\frac{3}{12} = 7\frac{15}{12} \\ - 2\frac{2}{3} = 2\frac{8}{12} = 2\frac{8}{12} \\ \hline \end{array}$$

2. 
$$\begin{array}{r} 7\frac{2}{5} = 7\frac{8}{20} = 6\frac{28}{20} \\ - 1\frac{3}{4} = 1\frac{15}{20} = 1\frac{15}{20} \\ \hline \end{array}$$

3. 
$$\begin{array}{r} 9\frac{3}{10} \\ - 3\frac{3}{4} \\ \hline \end{array}$$

4. 
$$\begin{array}{r} 8\frac{1}{4} \\ - 2\frac{1}{2} \\ \hline \end{array}$$

5. 
$$\begin{array}{r} 6\frac{3}{8} \\ - 3\frac{2}{3} \\ \hline \end{array}$$

6. 
$$\begin{array}{r} 5\frac{1}{3} \\ - 2\frac{7}{10} \\ \hline \end{array}$$

7. 
$$\begin{array}{r} 12\frac{1}{8} \\ - 4\frac{3}{4} \\ \hline \end{array}$$

8. 
$$\begin{array}{r} 14\frac{2}{3} \\ - 9\frac{1}{4} \\ \hline \end{array}$$

9. 
$$\begin{array}{r} 13\frac{2}{5} \\ - 8\frac{1}{2} \\ \hline \end{array}$$

10. 
$$\begin{array}{r} 10\frac{1}{5} \\ - 3\frac{5}{8} \\ \hline \end{array}$$

11. Which question did not involve regrouping? Why not?

- ★ 12. Scott, Sandra, and Gina worked as a group on a science model. Scott worked  $3\frac{1}{4}$  h, Sandra worked  $2\frac{1}{5}$  h, and Gina worked  $6\frac{3}{5}$  h. How much longer did Gina work than Scott and Sandra combined?

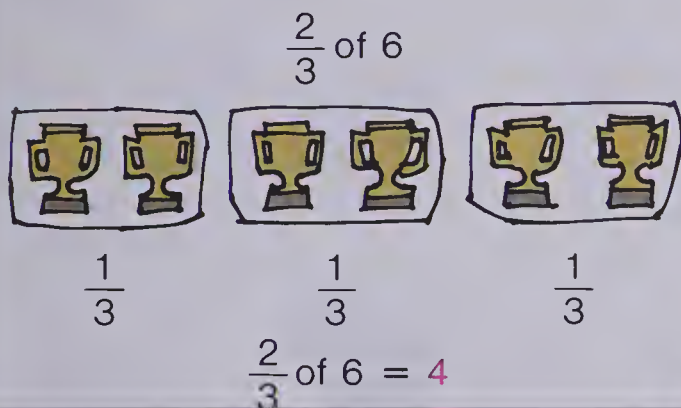


# The Trophy Shop

Centennial School ordered 6 trophies.

They want  $\frac{2}{3}$  of them delivered for the spring awards assembly.

How many should be sent?



$$\begin{aligned} & \frac{2}{3} \times 6 \\ &= \frac{2}{3} \times \frac{6}{1} \\ &= \frac{12}{3} \\ &= 4 \end{aligned}$$

Hint:

$$6 = \frac{6}{1}$$



## Exercises

Copy and complete.

1.  $\frac{1}{3}$  of 6 =  $\frac{1}{3} \times \frac{6}{1}$

=  $\frac{\blacksquare}{\blacksquare}$

=  $\blacksquare$

2.  $\frac{1}{5}$  of 15 =  $\frac{1}{5} \times \frac{15}{1}$

=  $\frac{\blacksquare}{\blacksquare}$

=  $\blacksquare$

3.  $\frac{3}{4}$  of 12 =  $\frac{3}{4} \times \frac{\blacksquare}{1}$

=  $\frac{\blacksquare}{\blacksquare}$

=  $\blacksquare$

Compute as above.

4.  $\frac{1}{4}$  of 16

5.  $\frac{1}{5}$  of 10

6.  $\frac{1}{10}$  of 30

7.  $\frac{1}{6}$  of 18

8.  $\frac{3}{4}$  of 16

9.  $\frac{3}{5}$  of 10

10.  $\frac{7}{10}$  of 30

11.  $\frac{5}{6}$  of 18

12.  $\frac{2}{3} \times 12$

13.  $\frac{3}{4} \times 20$

14.  $\frac{1}{8} \times 24$

15.  $\frac{3}{8} \times 24$

16.  $\frac{2}{5} \times 20$

17.  $\frac{1}{6} \times 24$

18.  $\frac{3}{10} \times 20$

19.  $\frac{7}{8} \times 16$

20.  $\frac{4}{5} \times 25$

21.  $\frac{2}{3} \times 21$

22.  $\frac{3}{2} \times 10$

23.  $\frac{7}{5} \times 10$

24.  $\frac{5}{4} \times 12$

25.  $\frac{6}{5} \times 10$

# The Art Class

Each student used  $\frac{1}{2}$  block of modelling clay.

How much did 3 students use?

$$3 \times \frac{1}{2}$$



$$\begin{aligned} 3 \times \frac{1}{2} &= \frac{3}{1} \times \frac{1}{2} \\ &= \frac{3}{2} \end{aligned}$$

$$\text{or } 1\frac{1}{2}$$

They used  $1\frac{1}{2}$  blocks in all.



Gabrielle used  $\frac{2}{5}$  jar of 4 different colours of tempera paint.

How much did she use in all?

$$4 \times \frac{2}{5}$$



$$\begin{aligned} 4 \times \frac{2}{5} &= \frac{4}{1} \times \frac{2}{5} \\ &= \frac{8}{5} \end{aligned}$$

$$\text{or } 1\frac{3}{5}$$

She used  $1\frac{3}{5}$  jars in all.



## Exercises

1.  $5 \times \frac{1}{3} = \frac{5}{1} \times \frac{1}{3}$   
 $= \frac{5}{3}$   
 $= 1\frac{2}{3}$

2.  $2 \times \frac{3}{4} = \frac{2}{1} \times \frac{3}{4}$   
 $= \frac{6}{4}$   
 $= 1\frac{1}{2}$

3.  $3 \times \frac{3}{5} = \frac{3}{1} \times \frac{3}{5}$   
 $= \frac{9}{5}$   
 $= 1\frac{4}{5}$

Compute as above.

4.  $5 \times \frac{3}{4}$

5.  $3 \times \frac{3}{8}$

6.  $2 \times \frac{3}{10}$

7.  $7 \times \frac{1}{2}$

8.  $3 \times \frac{2}{3}$

9.  $6 \times \frac{4}{5}$

10.  $4 \times \frac{5}{8}$

11.  $3 \times \frac{7}{10}$

12.  $7 \times \frac{5}{6}$

13.  $2 \times \frac{9}{10}$

14.  $5 \times \frac{2}{5}$

15.  $4 \times \frac{7}{8}$

16. How many balls of cord should the art teacher order for the school macramé display?  
 There are 36 art students, and each will use about  $\frac{2}{3}$  of a ball.

# Missing Fractions

When Jackie found her exercise book, which had been lost for a week, she noticed that some fractions were covered up by water marks.

$$1. \text{ [red mark]} + \frac{2}{3} = \frac{3}{3}$$

$$2. \frac{5}{8} - \text{[red mark]} = \frac{4}{8}$$

$$3. 3 \times \text{[red mark]} = \frac{3}{2}$$

$$4. \text{[red mark]} \times 4 = \frac{4}{3}$$



She was able to figure out the missing fractions.

## Exercises

Find the missing fractions. (Express answers in lowest terms.)

$$1. \text{ [red circle]} \blacksquare + \frac{3}{4} = \frac{4}{4}$$

$$\blacksquare = \underline{\hspace{1cm}}$$

$$2. \text{ [red circle]} \frac{5}{10} - \blacksquare = \frac{3}{10}$$

$$\blacksquare = \underline{\hspace{1cm}}$$

$$3. \frac{7}{8} + \blacksquare = \frac{11}{8}$$

$$4. \blacksquare + \frac{3}{8} = \frac{7}{8}$$

$$5. 5 \times \blacksquare = \frac{5}{3}$$

$$6. \blacksquare - \frac{2}{5} = \frac{3}{5}$$

$$7. \frac{3}{10} + \blacksquare = \frac{7}{10}$$

$$8. \frac{1}{3} \times \blacksquare = \frac{6}{3}$$

$$9. \blacksquare \times \frac{1}{2} = \frac{6}{10}$$

$$10. \blacksquare + \frac{3}{15} = \frac{10}{15}$$

Solve for  $n$ . ( $n$  represents the missing fraction.)

$$11. n + \frac{1}{10} = \frac{7}{10}$$

$$n = \frac{6}{10}$$

$$12. \text{ [red circle]} n - \frac{1}{10} = \frac{5}{10}$$

$$n = \blacksquare$$

$$13. \text{ [red circle]} n \times \frac{1}{3} = \frac{2}{3}$$

$$n = \blacksquare$$

$$14. \frac{9}{10} - n = \frac{4}{10}$$

$$15. \frac{3}{10} \times n = \frac{9}{10}$$

$$16. \frac{10}{12} - n = \frac{1}{12}$$

$$17. \frac{7}{12} + n = \frac{11}{12}$$

$$18. \frac{2}{3} \times n = \frac{8}{6}$$

$$19. n + n = \frac{4}{5}$$

Solve for  $n$ . (Use common denominators.)

$$20. \frac{1}{3} + n = \frac{11}{15}$$

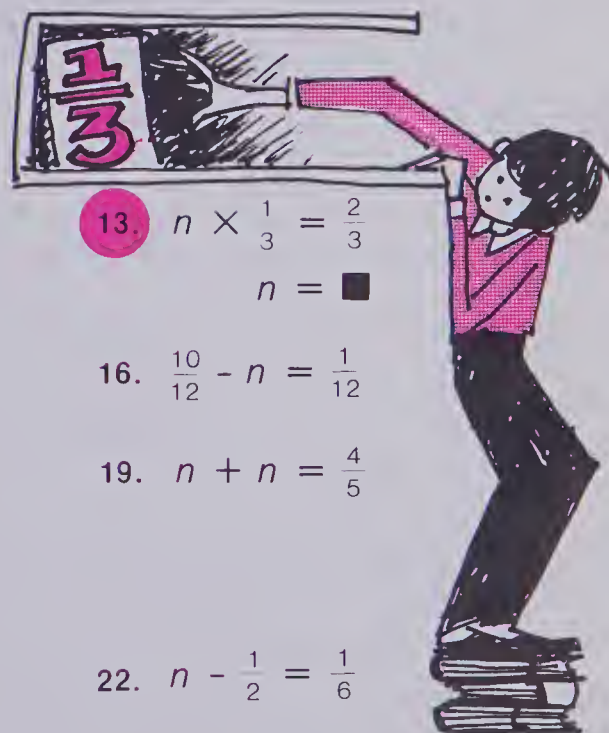
$$21. n + \frac{3}{10} = \frac{17}{20}$$

$$22. n - \frac{1}{2} = \frac{1}{6}$$

$$23. \frac{3}{4} - n = \frac{1}{2}$$

$$24. \frac{1}{4} + n = 1$$

$$25. n + n = \frac{1}{2}$$





# The Pizza Party

Bryan and Gail were late.  $\frac{3}{4}$  of a rectangular pizza was saved for them. They each ate  $\frac{1}{2}$  of that. What part of a whole pizza did Bryan eat?



$$\frac{1}{2} \text{ of } \frac{3}{4} = ? \longrightarrow \frac{1}{2} \times \frac{3}{4} = \frac{1 \times 3}{2 \times 4} = \frac{3}{8}$$

Bryan ate  $\frac{3}{8}$  of a rectangular pizza.

## Exercises

Compute.

1.  $\frac{1}{2}$  of  $\frac{3}{5} = \frac{1}{2} \times \frac{3}{5}$   
 $= \frac{\blacksquare \times \blacksquare}{\blacksquare \times \blacksquare}$   
 $= \frac{\blacksquare}{\blacksquare}$



2.  $\frac{1}{3}$  of  $\frac{3}{4} = \frac{1}{3} \times \frac{3}{4}$   
 $= \frac{\blacksquare \times \blacksquare}{\blacksquare \times \blacksquare}$   
 $= \frac{\blacksquare}{\blacksquare} \text{ or } \frac{\blacksquare}{\blacksquare}$



3.  $\frac{1}{2}$  of  $\frac{4}{5}$

4.  $\frac{1}{2}$  of  $\frac{3}{10}$

5.  $\frac{1}{3}$  of  $\frac{5}{8}$

6.  $\frac{1}{3}$  of  $\frac{3}{5}$

7.  $\frac{1}{4}$  of  $\frac{5}{6}$

8.  $\frac{1}{4}$  of  $\frac{7}{10}$

9.  $\frac{2}{3}$  of  $\frac{3}{4}$

10.  $\frac{3}{4}$  of  $\frac{2}{3}$

11.  $\frac{1}{2} \times \frac{5}{6}$

12.  $\frac{1}{3} \times \frac{9}{10}$

13.  $\frac{4}{5} \times \frac{5}{6}$

14.  $\frac{3}{10} \times \frac{2}{3}$

15.  $\frac{1}{2} \times \frac{5}{3}$

16.  $\frac{1}{3} \times \frac{7}{5}$

17.  $\frac{2}{3} \times \frac{5}{4}$

18.  $\frac{3}{4} \times \frac{3}{2}$

19. A large motorcycle has  $\frac{2}{5}$  as much mass as the pizza-delivery car. The car has a mass of  $\frac{3}{4}$  t. What is the mass of the motorcycle?

20. A motorcycle has a mass of  $\frac{1}{12}$  t. A racing bicycle has a mass that is  $\frac{2}{9}$  as much. What is the mass of the bicycle?

# Tumbling Fractions

**Reciprocals** are like tumbling fractions.



The reciprocal of  $\frac{3}{4}$  is  $\frac{4}{3}$ .

The reciprocal of  $\frac{4}{3}$  is  $\frac{3}{4}$ .

The *product* of two reciprocals is always 1.

$$\frac{3}{4} \times \frac{4}{3} = \frac{12}{12} = 1$$

The reciprocal of 4 is  $\frac{1}{4}$  because  $4 \times \frac{1}{4} = \frac{4}{4} = 1$ .



## Exercises

1. Copy and complete the chart for each.

$\frac{2}{3}$     $\frac{3}{5}$     $\frac{5}{8}$     $\frac{9}{4}$     $\frac{3}{10}$     $\frac{10}{7}$     $\frac{2}{1}$     $\frac{1}{3}$    5    $\frac{1}{8}$    3    $\frac{1}{4}$

Given fraction	Reciprocal	Product of both
$\frac{2}{3}$	$\frac{3}{2}$	$\frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1$
$\frac{3}{5}$	$\frac{5}{3}$	$\frac{3}{5} \times \frac{5}{3} = \frac{15}{15} = 1$

Solve for  $n$ .

2.  $n \times \frac{3}{4} = 1$

$n = \blacksquare$

3.  $n \times 5 = 1$

$n = \blacksquare$

4.  $\frac{1}{2} \times n = 1$

$n = \blacksquare$

5.  $\frac{4}{5} \times n = 1$

6.  $\frac{7}{10} \times n = 1$

7.  $\frac{7}{8} \times n = 1$

8.  $\frac{10}{3} \times n = 1$

9.  $6 \times n = 1$

10.  $4 \times n = 1$

11.  $\frac{5}{8} \times \frac{8}{5} = n$

12.  $\frac{2}{1} \times \frac{1}{2} = n$

13.  $\frac{7}{6} \times \frac{6}{7} = n$

14.  $n \times \frac{1}{3} = 1$

15.  $n \times \frac{1}{8} = 1$

16.  $14 \times n = 1$

# Division Using Reciprocals

How many  $\frac{1}{3}$ 's of a pie in 2 whole pies?



But:  $2 \times \frac{3}{1} = 6$

There are 6 one thirds in 2.

$$2 \div \frac{1}{3} = 6$$

Therefore:  $2 \div \frac{1}{3} = \frac{2}{1} \times \frac{3}{1}$

Reciprocals of the divisor can be used as a short cut when dividing.

For  $3 \div \frac{1}{4}$

write:  $\frac{3}{1} \times \frac{4}{1} = 12.$

To divide by a fraction, multiply by its reciprocal.



## Exercises

Rewrite each division question as a multiplication question and solve.

1.  $5 \div \frac{1}{4} = \frac{5}{1} \times \frac{4}{1}$   
= ■

2.  $5 \div \frac{1}{2} = \frac{5}{1} \times \frac{2}{1}$   
= ■

3.  $3 \div \frac{3}{5} = \frac{3}{1} \times \frac{5}{3}$   
= ■  
= ■

4.  $4 \div \frac{2}{3}$

5.  $3 \div \frac{5}{8}$

6.  $2 \div \frac{3}{4}$

7.  $5 \div \frac{3}{10}$

8.  $\frac{3}{5} \div 2 = \frac{3}{5} \times \frac{1}{2}$   
= ■

9.  $\frac{2}{3} \div 2$

10.  $\frac{5}{8} \div 3$

11.  $\frac{7}{10} \div 2$

12.  $\frac{3}{10} \div 3$

13.  $\frac{7}{12} \div 3$

14.  $\frac{1}{8} \div 3$

15.  $\frac{3}{5} \div 2$

16.  $\frac{7}{8} \div 5$

17.  $7 \div \frac{1}{3}$

18.  $\frac{3}{8} \div 2$

19.  $9 \div \frac{2}{5}$

20.  $\frac{9}{10} \div 2$

21.  $10 \div \frac{2}{5}$

22.  $\frac{4}{5} \div 3$

23. A group of campers ate 5 dozen eggs for breakfast. Each camper ate  $\frac{1}{4}$  dozen eggs. How many campers were there?

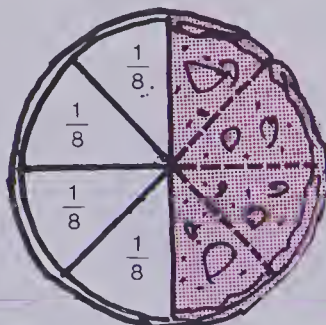


# Dividing Fractions

How many  $\frac{1}{8}$ 's of a pizza are in  $\frac{1}{2}$  pizza?

$$\begin{aligned}\frac{1}{2} \div \frac{1}{8} &= \frac{1}{2} \times \frac{8}{1} \\ &= \frac{8}{2} \\ &= 4\end{aligned}$$

There are 4 pieces.



There are four  $\frac{1}{8}$ 's in  $\frac{1}{2}$ .

To divide by a fraction, multiply by its reciprocal.



## Exercises

Write each division question as a multiplication question and solve.

Express all answers in lowest terms.

1.  $\frac{7}{8} \div \frac{1}{8} = \frac{7}{8} \times \frac{8}{1}$   
 $= \frac{\blacksquare}{\blacksquare}$   
 $= \blacksquare$

2.  $\frac{3}{5} \div \frac{1}{2} = \frac{3}{5} \times \frac{2}{1}$   
 $= \frac{\blacksquare}{\blacksquare}$   
 $= \blacksquare \frac{\blacksquare}{\blacksquare}$

3.  $\frac{3}{4} \div \frac{1}{2}$

4.  $\frac{9}{10} \div \frac{1}{3}$

5.  $\frac{7}{10} \div \frac{1}{4}$

6.  $\frac{2}{3} \div \frac{1}{10}$

7.  $\frac{4}{5} \div \frac{1}{10}$

8.  $\frac{7}{8} \div \frac{3}{10}$

9.  $\frac{9}{10} \div \frac{3}{4}$

10.  $\frac{11}{8} \div \frac{1}{2}$

11.  $\frac{1}{2} \div \frac{3}{4}$

12.  $\frac{1}{3} \div \frac{2}{3}$

13.  $\frac{1}{3} \div \frac{7}{10}$

14.  $\frac{3}{10} \div \frac{5}{8}$

15.  $\frac{1}{2} \div \frac{5}{6}$

16.  $\frac{3}{10} \div \frac{3}{4}$

17.  $\frac{2}{3} \div \frac{7}{8}$

18.  $\frac{1}{10} \div \frac{1}{2}$

19.  $\frac{3}{8} \div \frac{3}{5}$

20.  $\frac{1}{2} \div \frac{9}{10}$

★ 21. Explain why the answers to Questions 1 through 10 are greater than 1.

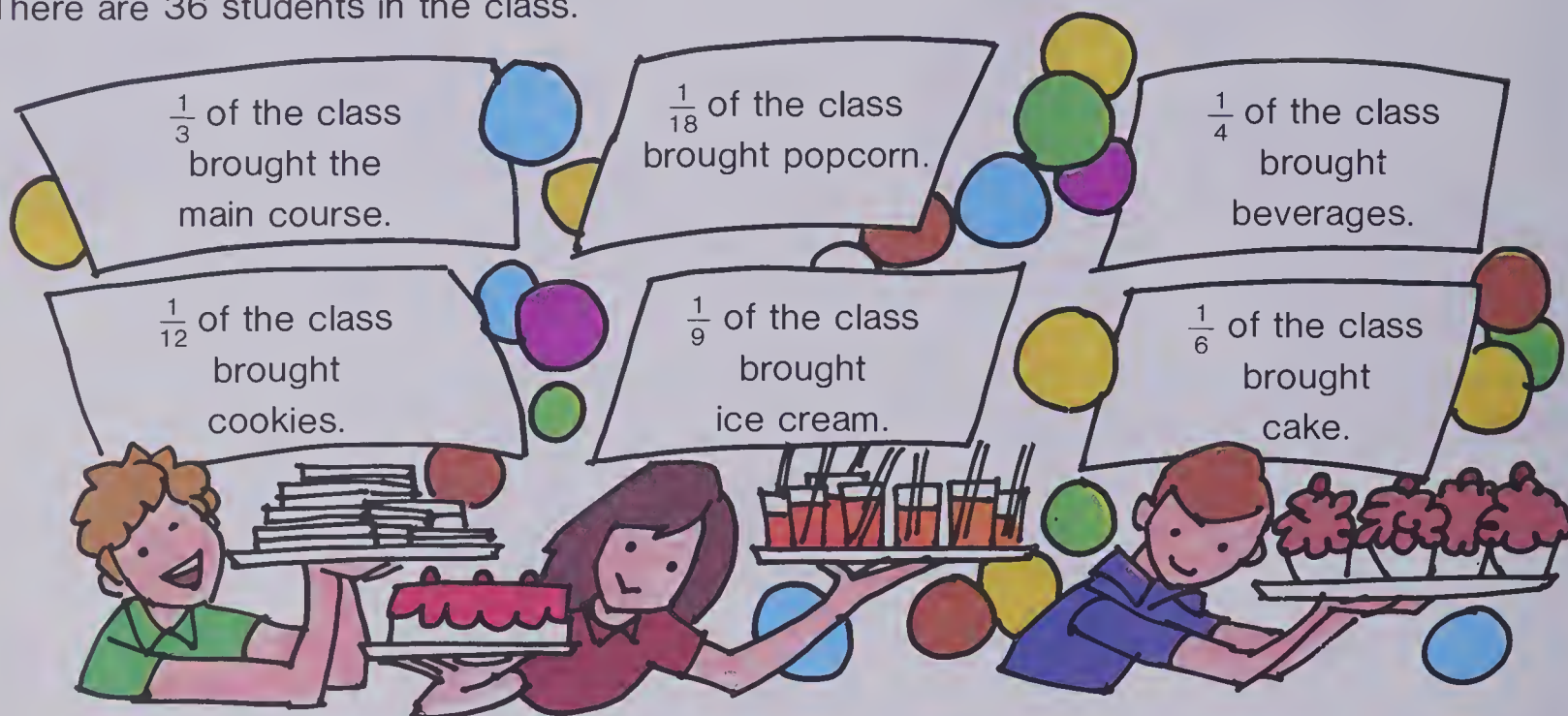
★ 22. Explain why the answers to Questions 11 through 20 are less than 1.

# The Class Party!

Mr. Williamson's class decided to have a class lunch.

Each member of the class volunteered to bring one item of the lunch.

There are 36 students in the class.



1. How many students brought each of the above items?
2. Did every student participate by bringing something for the lunch?
3. Each student who volunteered to bring ice cream brought 2 L. How many litres of ice cream were used?
4. Two food groups formed the clean-up committee. There were 6 people. Which food groups formed the clean-up committee?
5.  $\frac{1}{3}$  of a food group formed the games committee. Which group did the games committee come from if there were 4 on this committee?
- ★ 6. Plan your own class luncheon or picnic and determine what the class would like to eat. How many students should provide each type of food so that the cost is shared equally? What fraction of the class is providing each type of food?

# Mixed Numerals

$$1\frac{1}{2} \times 2\frac{2}{5} = \frac{3}{2} \times \frac{12}{5}$$

$$= \frac{36}{10}$$

$$= 3\frac{6}{10}$$

$$= 3\frac{3}{5}$$

*Step 1* Change mixed numerals to improper fractions.

*Step 2* Multiply the improper fraction.

*Step 3* Change the improper fraction to a mixed numeral and reduce.

$$2\frac{3}{4} \div 1\frac{1}{2} = \frac{11}{4} \div \frac{3}{2}$$

$$= \frac{11}{4} \times \frac{2}{3}$$

$$= \frac{22}{12}$$

$$= 1\frac{10}{12}$$

$$= 1\frac{5}{6}$$

*Step 1* Change to improper fractions.

*Step 2* Use reciprocal of divisor and change operation.

*Step 3* Multiply.

*Step 4* Change improper fraction to mixed numeral and reduce.



## Exercises

Express answers in lowest terms.

1.  $1\frac{3}{4} \times 1\frac{1}{3} = \frac{7}{4} \times \frac{4}{3}$

$$= \frac{\blacksquare}{\blacksquare}$$

$$= \frac{\blacksquare}{\blacksquare}$$

$$= \frac{\blacksquare}{\blacksquare}$$

2.  $3\frac{1}{2} \times 1\frac{2}{3} = \frac{\blacksquare}{2} \times \frac{\blacksquare}{3}$

$$= \frac{\blacksquare}{\blacksquare}$$

$$= \frac{\blacksquare}{\blacksquare}$$

3.  $3\frac{3}{5} \times 2\frac{1}{2}$

4.  $2\frac{1}{10} \times 1\frac{3}{7}$

5.  $1\frac{1}{5} \times 4\frac{4}{9}$

6.  $5\frac{1}{3} \times 2\frac{1}{4}$

7.  $3\frac{1}{2} \times 1\frac{5}{7}$

8.  $3\frac{1}{5} \times 1\frac{1}{4}$

9.  $2\frac{1}{3} \times 2\frac{7}{10}$

10.  $1\frac{7}{8} \times 6\frac{2}{5}$

Calculate.

11.  $1\frac{1}{4} \div 2\frac{1}{2} = \frac{\blacksquare}{4} \div \frac{\blacksquare}{2}$

$$= \frac{\blacksquare}{4} \times \frac{2}{\blacksquare}$$

12.  $3\frac{1}{2} \div 1\frac{1}{4} = \frac{\blacksquare}{2} \div \frac{\blacksquare}{4}$

$$= \frac{\blacksquare}{2} \times \frac{4}{\blacksquare}$$

13.  $4\frac{1}{2} \div 2\frac{1}{3}$

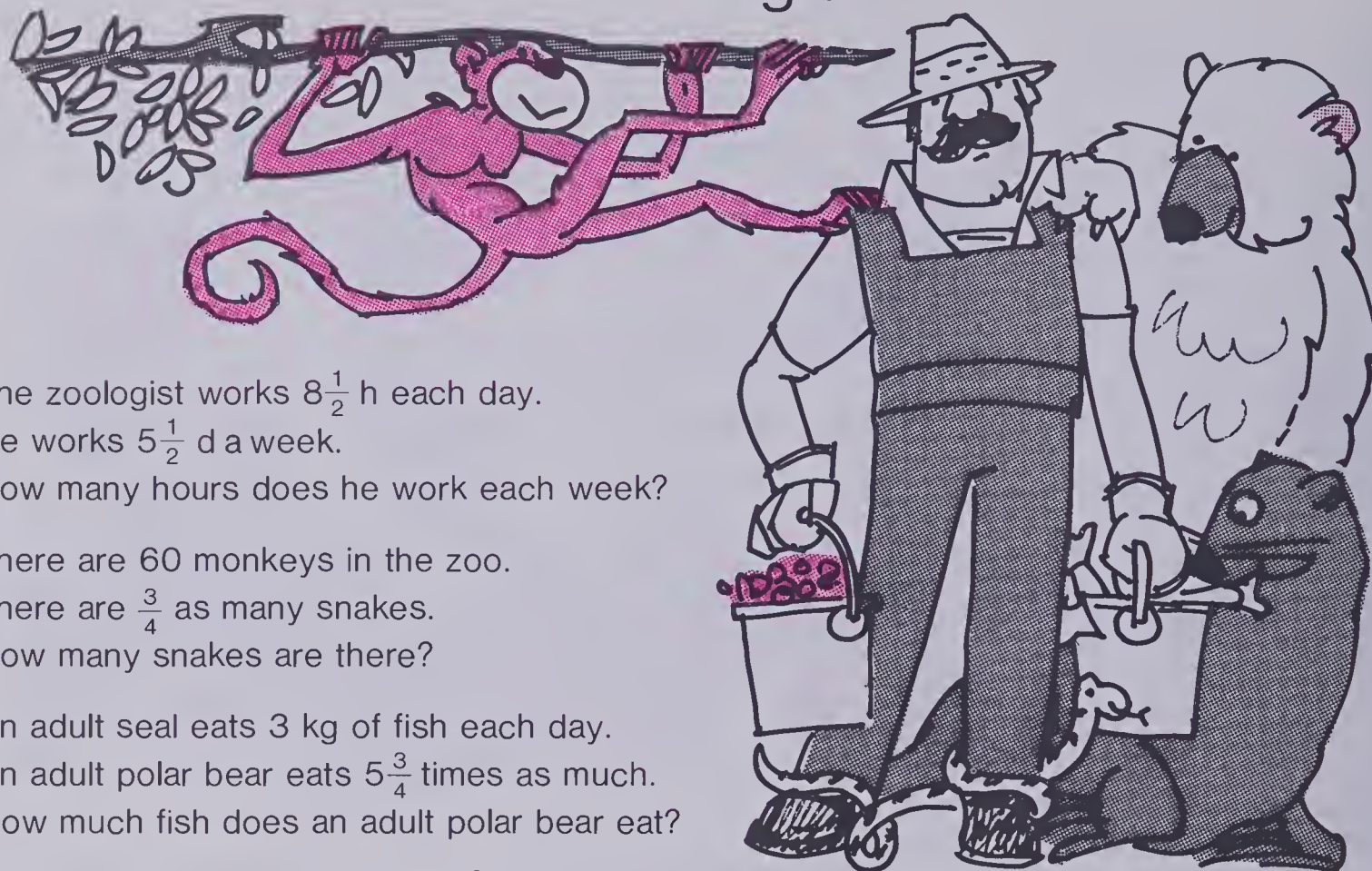
14.  $3\frac{1}{2} \div 2\frac{1}{2}$

15.  $5\frac{1}{4} \div 2\frac{1}{3}$

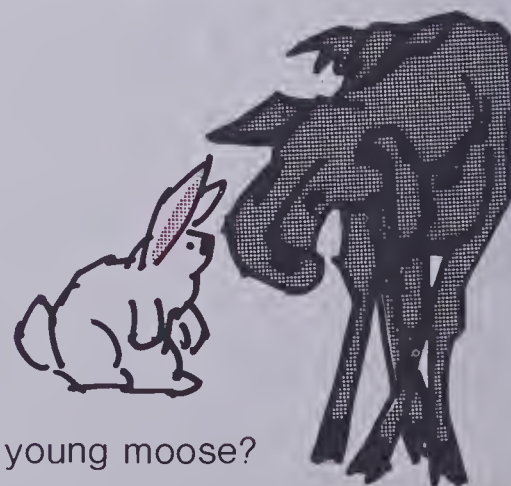
16.  $5\frac{1}{3} \div 4\frac{1}{4}$



# The Zoologist



1. The zoologist works  $8\frac{1}{2}$  h each day.  
He works  $5\frac{1}{2}$  d a week.  
How many hours does he work each week?
2. There are 60 monkeys in the zoo.  
There are  $\frac{3}{4}$  as many snakes.  
How many snakes are there?
3. An adult seal eats 3 kg of fish each day.  
An adult polar bear eats  $5\frac{3}{4}$  times as much.  
How much fish does an adult polar bear eat?
4. A Thomson's gazelle can run  $1\frac{2}{3}$  times as fast as a grizzly bear.  
A grizzly bear can run 48 km/h.  
How fast can a Thomson's gazelle run?
5. The zoologist told the keeper to put 21 kg of monkey feed in the monkey cage each day.  
Each monkey eats  $\frac{3}{4}$  kg of feed.  
How many monkeys are in the cage?
6. A chicken egg develops for 21 d before it hatches.  
A duck egg takes  $1\frac{3}{7}$  times as long.  
How long does it take a duck egg to hatch?
7. A baby rabbit is born about 36 d after it is conceived.  
A baby moose takes  $6\frac{2}{3}$  times as long before it is born.  
How many days after conception will a moose give birth to a young moose?

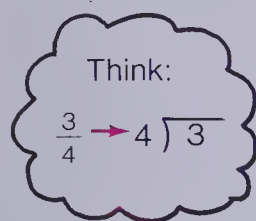


# Decimal Equivalents

About  $\frac{3}{4}$  of a ship is above water.

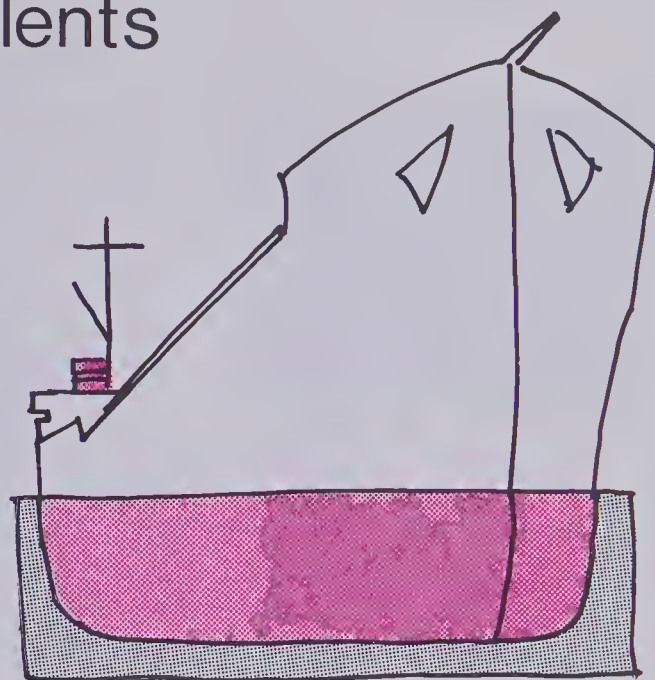
Express this fraction as a decimal.

We find the decimal equivalent by dividing:



$$\begin{array}{r} 0.75 \\ 4 \overline{) 3.00} \\ \underline{28} \phantom{0} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

The decimal equivalent of  $\frac{3}{4}$  is 0.75.



0.75 of the ship is above water.

## Exercises

Divide to find the decimal equivalents.

1.  $\frac{1}{4}$

2.  $\frac{1}{5}$

3.  $\frac{4}{5}$

4.  $\frac{3}{5}$

5.  $\frac{1}{25}$

6.  $\frac{1}{50}$

7.  $\frac{7}{20}$

8.  $\frac{9}{25}$

9.  $\frac{19}{50}$

10.  $\frac{21}{25}$

11.  $\frac{19}{20}$

12.  $\frac{37}{50}$

By dividing we know

$$\frac{1}{20} = 0.05$$

Therefore:

$$\begin{aligned} \frac{7}{20} &= 7 \times \frac{1}{20} \\ &= 7 \times 0.05 \\ &= 0.35 \end{aligned}$$

Find these decimal equivalents using multiplication:

13.  $\frac{3}{20}$

14.  $\frac{8}{20}$

15.  $\frac{11}{20}$

16.  $\frac{19}{20}$

Find these decimal equivalents using multiplication.

17.  $\frac{3}{8}$

18.  $\frac{5}{8}$

19.  $\frac{7}{8}$

20.  $\frac{6}{8}$

$$\frac{1}{8} = 0.125$$

# Repeating Decimals

Dividing to find the decimal equivalents of  $\frac{1}{3}$  and  $\frac{3}{11}$  produces some interesting patterns.

$$\frac{1}{3} = ?$$

$$\begin{array}{r} 0.333 \dots \\ 3 \overline{) 1.000} \\ \underline{9} \phantom{00} \\ 10 \phantom{0} \\ \underline{9} \phantom{0} \\ 10 \phantom{0} \\ \underline{9} \phantom{0} \end{array}$$

$$\frac{1}{3} = 0.333 \dots$$

$$\frac{3}{11} = ?$$

$$\begin{array}{r} 0.2727 \dots \\ 11 \overline{) 3.0000} \\ \underline{22} \phantom{000} \\ 80 \phantom{0} \\ \underline{77} \phantom{0} \\ 30 \phantom{0} \\ \underline{22} \phantom{0} \\ 80 \phantom{0} \end{array}$$

$$\frac{3}{11} = 0.2727 \dots$$

Which numbers repeat?



## Exercises

Use division and/or patterns to determine the decimal equivalents.

- |                    |                    |                     |                    |                    |
|--------------------|--------------------|---------------------|--------------------|--------------------|
| 1. $\frac{1}{6}$   | 2. $\frac{2}{6}$   | 3. $\frac{3}{6}$    | 4. $\frac{4}{6}$   | 5. $\frac{5}{6}$   |
| 6. $\frac{1}{9}$   | 7. $\frac{2}{9}$   | 8. $\frac{3}{9}$    | 9. $\frac{4}{9}$   | 10. $\frac{5}{9}$  |
| 11. $\frac{6}{9}$  | 12. $\frac{7}{9}$  | 13. $\frac{8}{9}$   | 14. $\frac{1}{11}$ | 15. $\frac{2}{11}$ |
| 16. $\frac{3}{11}$ | 17. $\frac{4}{11}$ | 18. $\frac{5}{11}$  | 19. $\frac{6}{11}$ | 20. $\frac{7}{11}$ |
| 21. $\frac{8}{11}$ | 22. $\frac{9}{11}$ | 23. $\frac{10}{11}$ |                    |                    |

24. Pick out 2 pairs of equivalent fractions that have identical decimal equivalents.

★ 25. Investigate fractions whose denominators are 27, 33, 66, 45. What do you notice about their decimal equivalents?



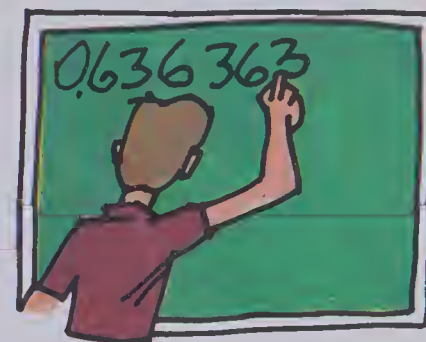
# Rounding Repeating Decimals

In order to use repeating decimals such as  $0.636\ 363\ \dots$  in calculations, we round the decimal to the degree of accuracy required.

$0.636\ 363\ \dots$  to the nearest tenth = 0.6

$0.636\ 363\ \dots$  to the nearest hundredth = 0.64

$0.636\ 363\ \dots$  to the nearest thousandth = 0.636



## Exercises

Round to the nearest tenth.

1.  $0.333\ \dots$

2.  $0.1818\ \dots$

3.  $0.3939\ \dots$

Round as indicated in the chart.

	Repeating decimal	To nearest tenth	To nearest hundredth	To nearest thousandth
4.	$0.833\ 33\ \dots$			
5.	$0.454\ 545\ \dots$			
6.	$0.575\ 757\ \dots$			
7.	$0.606\ 060\ \dots$			
8.	$0.148\ 148\ \dots$			
9.	$0.727\ 272\ \dots$			
10.	$0.740\ 740\ \dots$			



11. Baseball batting averages are calculated by dividing:

$$\frac{\text{number of hits}}{\text{number of times at bat}}$$

The quotient is then rounded to 3 decimal places.

Find each player's batting average.

(a) 2 hits in 9 times at bat

$$\begin{array}{r} \text{■.■■■} \\ 9 \overline{) 2.000} \end{array}$$

(b) 6 hits in 11 times at bat

(c) 45 hits in 147 times at bat

(d) 26 hits in 97 times at bat

# Chapter Test

1. Complete to form an equivalent fraction!  $\frac{4}{5} = \frac{\blacksquare}{30}$

Calculate.

$$\begin{array}{r} 2. \quad \frac{9}{10} \\ - \frac{3}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad \frac{7}{10} \\ + \frac{2}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad \frac{5}{8} \\ + \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad \frac{4}{5} \\ - \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad \frac{3}{4} \\ + \frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad \frac{3}{10} \\ - \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad \frac{7}{12} \\ + \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad \frac{3}{4} \\ - \frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 3\frac{5}{6} \\ + 2\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad 6\frac{1}{8} \\ - 2\frac{4}{5} \\ \hline \end{array}$$

12. Which is larger —  $\frac{7}{10}$  or  $\frac{4}{5}$ ?

13. Find  $\frac{2}{3}$  of 45.

Calculate.

$$14. \quad \frac{3}{4} \times 16$$

$$15. \quad \frac{2}{5} \times 25$$

$$16. \quad 3 \times \frac{1}{2}$$

$$17. \quad \frac{3}{4} \times \frac{4}{5}$$

$$18. \quad \frac{7}{10} \times \frac{2}{5}$$

$$19. \quad 2\frac{1}{4} \times 3\frac{1}{2}$$

$$20. \quad 3\frac{3}{4} \times 1\frac{1}{3}$$

$$21. \quad 4\frac{1}{3} \div 2\frac{1}{2}$$

Divide.

$$22. \quad \frac{4}{5} \div \frac{1}{2}$$

$$23. \quad 3 \div \frac{1}{6}$$

$$24. \quad \frac{9}{10} \div \frac{3}{5}$$

$$25. \quad \frac{8}{9} \div 2$$

Solve for  $n$ .

$$26. \quad \frac{5}{8} + n = \frac{7}{8}$$

$$27. \quad \frac{3}{4} - n = \frac{1}{2}$$

$$28. \quad 6 \times n = 3$$

Write as a decimal.

$$29. \quad \frac{2}{3}$$

$$30. \quad \frac{5}{100}$$

$$31. \quad \frac{3}{5}$$

$$32. \quad \frac{17}{25}$$

Write as a mixed numeral.

$$33. \quad \frac{39}{10}$$

$$34. \quad \frac{12}{5}$$

$$35. \quad \frac{25}{8}$$

36. A class contains 35 students.  $\frac{5}{7}$  of the class are in the class play.
- How many students are in the play?
  - How many students are not in the play?

# Cumulative Review

Perform the indicated operations.

$$\begin{array}{r} 1. \quad \$ 32.70 \\ 189.16 \\ + 703.09 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 0.935 \\ - 0.192 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 35.1 \\ \times 100 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 2037 \\ \times 5.3 \\ \hline \end{array}$$

$$5. \quad 6 \overline{) 384.6}$$

$$6. \quad 1.3 \overline{) 59.67}$$

$$7. \quad 7 \times 7 \times 7$$

$$\begin{array}{r} 8. \quad \frac{5}{8} \\ + \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad \frac{11}{12} \\ - \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 2\frac{2}{3} \\ + 9\frac{1}{4} \\ \hline \end{array}$$

$$11. \quad 20 \times \frac{3}{10}$$

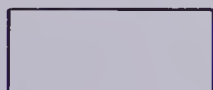
$$12. \quad \frac{1}{3} \times \frac{5}{8}$$

$$13. \quad 1\frac{2}{5} \times 2\frac{1}{2}$$

$$14. \quad 4 \div \frac{1}{3}$$

$$15. \quad \frac{5}{8} \div \frac{1}{4}$$

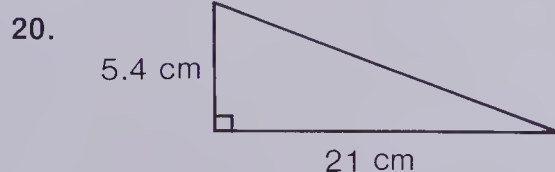
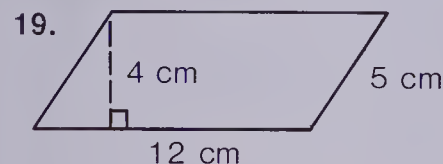
16. What is the angle sum of the four angles in this rectangle?



17. Write as a standard numeral.  
(a)  $10^5$       (b)  $3^4$

18. What is the time 3 h 15 min after 08:45?

Calculate the area.



Which is larger?

21.  $\frac{2}{5}$  or  $\frac{1}{2}$

22.  $2^3$  or  $3^2$

Solve for  $n$ .

23.  $n + 25 = 37$

24.  $7 \times n = 56$

25.  $n + \frac{1}{6} = \frac{5}{6}$

26.  $\frac{5}{8} - n = \frac{3}{8}$

27.  $n + n = \frac{6}{5}$

28.  $n \times n = 16$

29. 100 record albums have a mass of 17 000 g.  
What is the mass of 1 album?

30. The perimeter of a square is 16.8 cm.  
What is the length of each side?



# Chapter 8

# Ratio and Percent

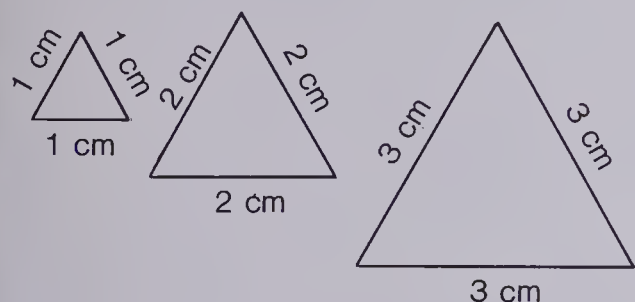
Average

Scale Ratio



# Ratios

**Ratios** are number comparisons.



We can compare the length of each side of each equilateral triangle with its perimeter.

Length of each side	1	2	3	5	7
Perimeter	3	6	9	■	■



The comparison or *ratio* of length of sides to perimeter is:

1 to 3

or

1:3

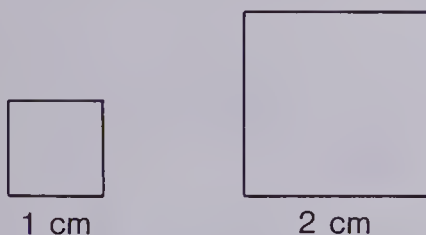
or

$\frac{1}{3}$

## Exercises

Copy and complete these ratio charts.

1.



### Squares

Side length	1	2	3	5	■	8	■	12
Perimeter	4	■	■	■	28	■	40	■

2.



### Regular hexagons

Side length	1	2	3	4	■	9	■	15
Perimeter	6	■	■	■	36	■	72	■

3. (a)

Side length	1	2	3	4	5
Perimeter	■	10	15	■	■

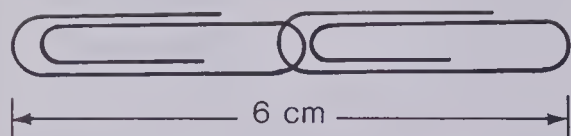
(b) What regular polygon is this?

4. (a)

Side length	1	2	3	4	7
Perimeter	■	■	24	■	■

(b) What is this regular polygon called?

# Paper-clip Chains

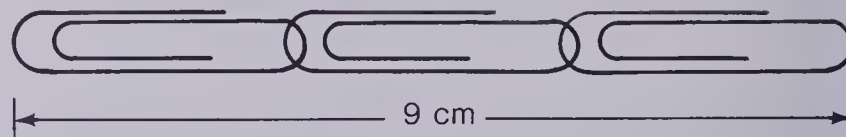


The ratio of the number of clips to the length of the chain

is  $2:6$ .

This ratio can also be written as:

$2$  to  $6$  or  $2:6$  or  $\frac{2}{6}$ .



The ratio of the number of clips to the length of the chain

is  $3:9$ .

This ratio can also be written as:

$3$  to  $9$  or  $3:9$  or  $\frac{3}{9}$ .

The ratios are equivalent because  $\frac{2}{6} = \frac{1}{3}$  and  $\frac{3}{9} = \frac{1}{3}$ .

## Activities

- I
- Make paper-clip chains using:
    - 5 clips
    - 7 clips
    - 10 clips
  - Measure each chain (in centimetres) and record the ratio of  $\frac{\text{number of clips}}{\text{length of chain}}$ .
  - Check that all the ratios are equivalent.
  - Copy and complete this chart.
- | Number of clips | 3 | 5 | 7 | 10 | 12 | 14 |
|-----------------|---|---|---|----|----|----|
| Chain length    |   |   |   |    |    |    |
- ★ 5. Using your ratios, find out how long a chain would be with each number of clips.
- 15 clips
  - 21 clips
  - 20 clips
  - 50 clips
  - 63 clips
  - 80 clips

- II
- Find the lengths of the pieces of chalk as shown below.  
Copy and complete this chart.

Number of pieces of chalk	1	2	3	4	10	20	25
Total length							



# Cross Products

These two ratios are equivalent.

$$\frac{3}{4} \quad \frac{9}{12}$$

$$4 \times 9 = 36$$

$$3 \times 12 = 36$$

$$4 \times 9 = 3 \times 12$$

The cross products are equal.

$$\text{Thus } \frac{3}{4} = \frac{9}{12}.$$

These two ratios are *not* equivalent.

$$\frac{2}{5} \quad \frac{6}{14}$$

$$5 \times 6 = 30$$

$$2 \times 14 = 28$$

$$5 \times 6 \neq 2 \times 14$$

The cross products are *not* equal.

$$\text{Thus } \frac{2}{5} \neq \frac{6}{14}.$$

## Exercises

Calculate cross products to find whether these ratios are equivalent. (Use = or  $\neq$ .)

1.  $\frac{3}{2} \quad \frac{9}{5}$

2.  $\frac{15}{24} \quad \frac{5}{8}$

3.  $\frac{4}{5} \quad \frac{17}{21}$

4.  $\frac{60}{40} \quad \frac{3}{2}$

5.  $\frac{20}{9} \quad \frac{7}{3}$

6.  $\frac{6}{7} \quad \frac{12}{15}$

7.  $\frac{7}{8} \quad \frac{21}{24}$

8.  $\frac{10}{12} \quad \frac{5}{6}$

9.  $\frac{1.5}{2} \quad \frac{3}{4}$

10.  $\frac{6}{25} \quad \frac{1.2}{5}$

11.  $\frac{3.5}{14} \quad \frac{1}{4}$

Use equal cross products to find the missing terms in the equivalent ratios.

12.  $\frac{1}{2} \quad \frac{\square}{10}$

$$2 \times \square = 1 \times 10$$

$$2 \times \square = 10$$

$$\square = 5$$

$$\frac{1}{2} = \frac{5}{10}$$

13.  $\frac{2}{3} = \frac{\square}{9}$

14.  $\frac{5}{6} = \frac{\square}{24}$

15.  $\frac{3}{4} = \frac{12}{\square}$

16.  $\frac{4}{5} = \frac{20}{\square}$

17.  $\frac{7}{10} = \frac{\square}{40}$

18.  $\frac{7}{8} = \frac{35}{\square}$

19.  $\frac{1}{6} = \frac{5}{\square}$

20.  $\frac{\square}{3} = \frac{4}{12}$

21.  $\frac{2}{\square} = \frac{10}{25}$

22.  $\frac{7}{\square} = \frac{21}{24}$

Write these ratios in lowest terms. Check your answers, using cross products.

23.  $\frac{16}{20} = \frac{\square}{\square}$

24.  $\frac{5}{15} = \frac{\square}{\square}$

25.  $\frac{12}{30} = \frac{\square}{\square}$

★ 26.  $\frac{30}{72} = \frac{\square}{\square}$

- ★ 27. Toothpaste is \$1.98 for 150 mL or \$2.54 for 250 mL.  
Which is the better buy?

# Track and Pool Ratios

Sandy can walk 6 km in 60 min.

At this rate, how far would Sandy walk in 35 min?

Step 1 Set up equivalent ratios:

$$\text{Ratio: } \frac{\text{Distance}}{\text{Time}} \rightarrow \frac{6}{60} = \frac{\blacksquare}{35}$$

Step 2 Cross products:

$$60 \times \blacksquare = 6 \times 35$$

Step 3 Related division statement:

$$\blacksquare \times 60 = 210$$

$$210 \div 60 = \blacksquare$$

Step 4 Divide:

$$3.5 = \blacksquare$$

$$\begin{array}{r} 3.5 \\ 60 \overline{) 210.0} \\ \underline{180} \phantom{0} \\ 300 \\ \underline{300} \\ 0 \end{array}$$



Sandy could walk 3.5 km in 35 min.

## Exercises

Use the 4 steps to help you.

1. Sandy's younger brother, Michael, can walk 5 km in 60 min.

At this rate, how far could Michael walk in:

- (a) 120 min?      (b) 30 min?      (c) 48 min?      (d) 4 h?

2. Sandy and Mike can run 100 m in the three-legged race in 40 s.

At this rate, how far could they run in:

- (a) 20 s?      (b) 60 s?      (c) 2 min?

Remember  
60 min = 1 h  
60 s = 1 min

3. Karen can swim 200 m in 4 min. At this rate how far could she swim in:

- (a) 1 min?      (b) 6 min?      (c) 20 min?      (d) 1 h?

At this rate, how long (in minutes) would it take her to swim:

- (e) 100 m?      (f) 400 m?      (g) 50 m?      (h) 500 m?

4. Karen's brother can run 1500 m in 6 min.

At this rate, how far could he run in:

- (a) 3 min?      (b) 9 min?      (c) 12 min?      (d) 15 min?

At this rate, how long (in minutes) would it take him to run:

- (e) 500 m?      (f) 2000 m?      (g) 1000 m?

# The Shopping Mall

Merchants rent floor space in shopping malls at a yearly rate based on the floor area in square metres.

Bob's Hobby Shop rents 50 m<sup>2</sup> of floor space at a rate of \$150/m<sup>2</sup> for each year.

What is the yearly rent?

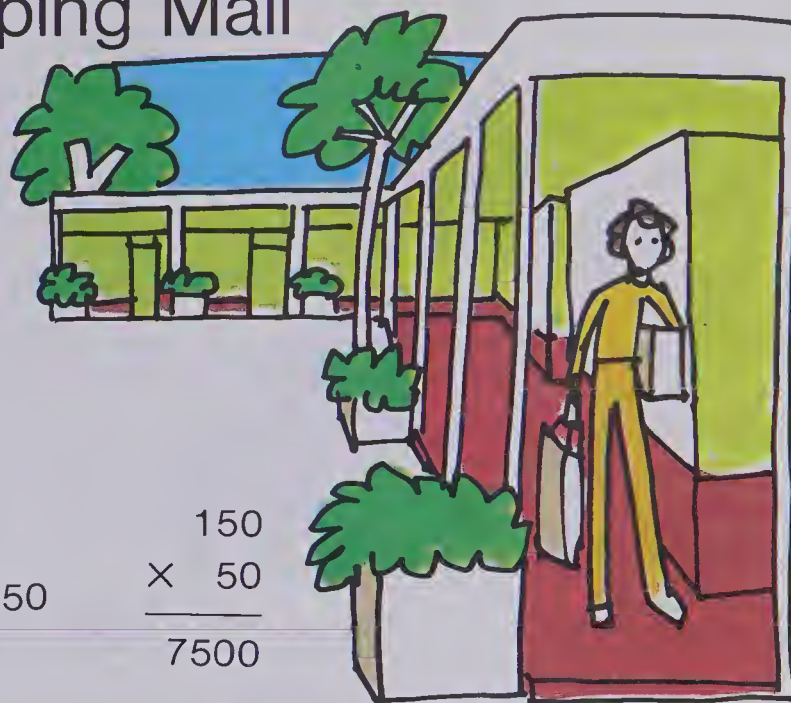
Use the ratios:  $\frac{\text{Floor Area}}{\text{Yearly Rent}} \rightarrow \frac{1}{150} = \frac{50}{\blacksquare}$

$$1 \times \blacksquare = 50 \times 150$$

$$\blacksquare = 7500$$

$$\begin{array}{r} 150 \\ \times 50 \\ \hline 7500 \end{array}$$

The rent for one year is \$7500.



## Exercises

- Bob needs more room and is considering renting a larger store. Calculate the yearly rents for these larger stores.

	Rate					
Floor area (m <sup>2</sup> )	1	80	100	140	200	210
Yearly rent	\$150					

- A large food store can rent space for \$130/m<sup>2</sup> for one year. Calculate the yearly rent for the following floor areas.

(a) 600 m<sup>2</sup>                      (b) 850 m<sup>2</sup>                      (c) 1000 m<sup>2</sup>                      (d) 1800 m<sup>2</sup>

- Roasts of beef sell for \$7.40/kg in the food store. Calculate the cost of the following roasts.

(a) 2 kg                      (b) 5 kg                      (c) 3.2 kg                      (d) 4.5 kg

- Calculate the sales tax for these purchases at a rate of 7%.

Price	\$2.00	\$1.00	\$5.00	\$12.30	\$45.00	\$100.00
Sales tax	\$0.14					



# The Special Ratio

A ratio compared to 100 can be expressed as a **percent**.

Philip achieved 72 marks out of a possible 100 on a math test.

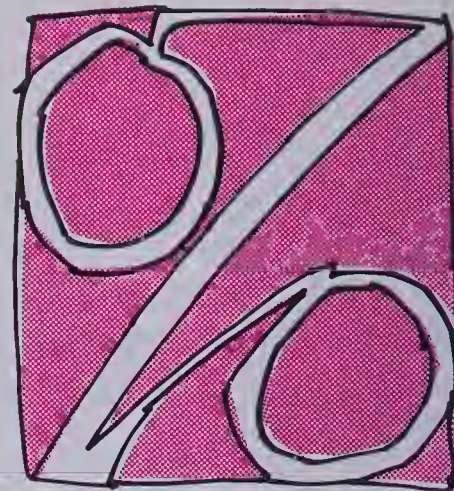
The ratio is  $\frac{72}{100}$  or 72%.

Philip's mark is 72%.

Tanya achieved 19 marks out of a possible 25 marks on her math test.

The ratio is  $\frac{19}{25}$  or  $\frac{19 \times 4}{25 \times 4} = \frac{76}{100}$ .

Tanya's mark is 76%.



## Exercises

Write the following ratios as percents.

1. 60 to 100

2. 17 to 100

3. 43 to 100

4. 97 to 100

5. 85:100

6. 12:100

7. 9:100

8. 1:100

9.  $\frac{25}{100}$

10.  $\frac{50}{100}$

11.  $\frac{3}{100}$

12.  $\frac{7}{100}$

Express each ratio as a ratio compared to 100, and then as a percent.

13.  $\frac{7 \times 10}{10 \times 10} = \frac{70}{100} = \blacksquare\%$

14.  $\frac{4 \times \blacksquare}{10 \times \blacksquare} = \frac{\blacksquare}{100} = \blacksquare\%$

15.  $\frac{9 \times 5}{20 \times 5} = \frac{\blacksquare}{100} = \blacksquare\%$

16.  $\frac{12 \times 4}{25 \times 4} = \frac{\blacksquare}{100} = \blacksquare\%$

17.  $\frac{20}{25}$

18.  $\frac{22}{25}$

19.  $\frac{3}{5}$

20.  $\frac{4}{5}$

21.  $\frac{1}{4}$

22.  $\frac{3}{4}$

23.  $\frac{19}{50}$

24.  $\frac{45}{50}$

25.  $\frac{11}{20}$

26.  $\frac{7}{20}$

27.  $\frac{13}{25}$

28.  $\frac{19}{20}$

29. Krista achieved 24 marks out of a possible 25 marks on her math test. What was her percent mark?

30. Steve achieved 18 out of a possible 20 marks. What was his percent mark?

# Exams and Sports

1. John received the following marks on exams.

Language Arts —  $\frac{16}{25}$   
 Spelling —  $\frac{42}{50}$   
 Social Studies —  $\frac{15}{20}$

Mathematics —  $\frac{32}{50}$   
 Science —  $\frac{9}{20}$



- Express each mark as a percent.
- Which subject is best?
- Which subject requires more studying?

2. Last week Judy was practising her free-throw shots in basketball.

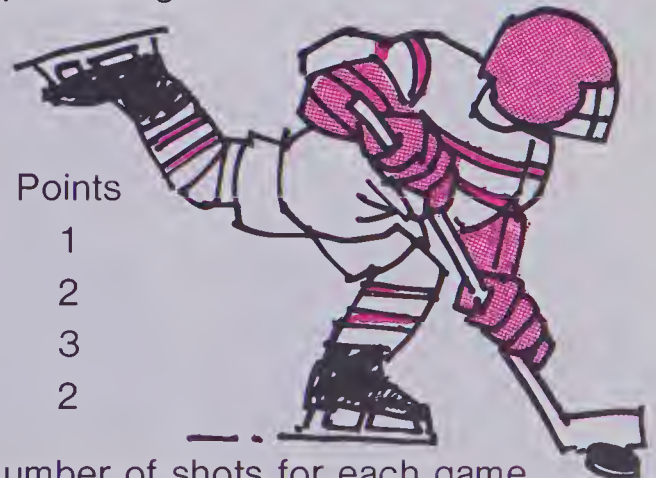
On Monday she sank 8 out of 20 shots.  
 On Tuesday she sank 5 out of 10 shots.  
 On Wednesday she sank 13 out of 25 shots.  
 On Thursday she sank 9 out of 20 shots.  
 On Friday she sank 21 out of 50 shots.



- Express each day's record as a percent.
- Which day did Judy have the highest free-throw percentage?

3. Tom plays defence in a minor hockey league.  
 Here are his statistics for the first four games.

	Shots on Goal	Goals	Assists	Points
Game 1	2	0	1	1
Game 2	5	1	1	2
Game 3	5	0	3	3
Game 4	4	1	1	2



- Find the goal-scoring percentage based on the number of shots for each game.
- Find the point percentage based on the number of shots for each game.
- For which game did Tom have the best goal-scoring percentage?
- For which game did Tom have the best point percentage?



# Percents and Decimals

Percent is a comparison to 100. It can be expressed as a decimal.

Express as decimals.

(a) 45%

$$45\% = \frac{45}{100} = \boxed{0.45}$$

(b) 9%

$$9\% = \frac{9}{100} = \boxed{0.09}$$

Express as percents.

(a) 0.85

$$0.85 = \frac{85}{100} = 85\%$$

(b) 0.07

$$0.07 = \frac{7}{100} = 7\%$$

## Exercises

1. Express as decimals.

(a)  $25\% = \frac{\blacksquare}{100} = \blacksquare$

(b)  $3\% = \frac{\blacksquare}{100} = \blacksquare$

(c) 50% (d) 17% (e) 93%

(f) 35% (g) 85% (h) 8%

(i) 20% (j) 1%

2. Copy and complete these place-value charts.

	ones	tenths	hundredths
(a) 45%	0	4	5
(b) 9%	0	0	9
(c) 85%	0	■	■
(d) 7%	0	■	■

	ones	tenths	hundredths
(e) 70%	■	■	■
(f) 17%	■	■	■
(g) 0%	■	■	■
(h) 100%	■	■	■

Express as percents.

3. (a)  $0.75 = \frac{\blacksquare}{100} = \blacksquare\%$

(b)  $0.02 = \frac{2}{100} = \blacksquare\%$

(c) 0.41

(d) 0.89

(e) 0.05

(f) 0.99

(g) 0.5

(h) 0.3

(i) 0.01

4. Out of every dollar's allowance, Jamie saves \$0.25.  
What percent does he save?

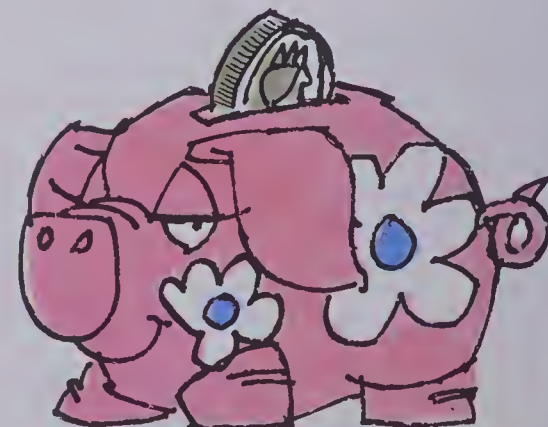
5. Mr. Thompson earns \$1000 per month (after taxes are paid).  
He pays \$380 for rent, \$260 for food, and saves \$70.  
What percent of his salary does he use for:

(a) rent?

(b) food?

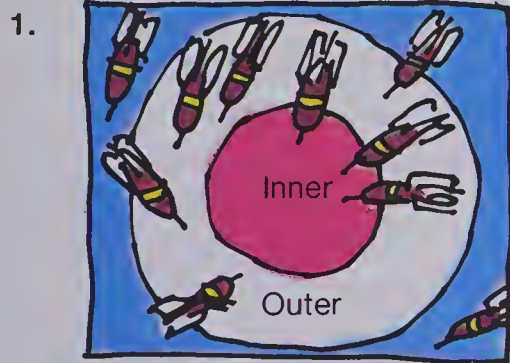
(c) savings?

★(d) other expenses?



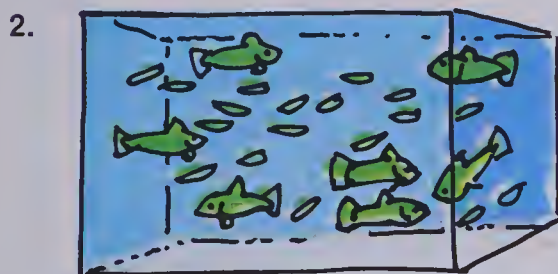


# Percent Problems



10 darts were thrown at the dart board.

- How many darts hit the inner ring?
- How many darts hit the outer ring?
- How many darts missed the rings?
- What percent hit the inner ring?
- What percent hit the outer ring?
- What percent missed the rings?



There are 25 fish in the classroom aquarium.

7 are adult fish, and the rest are young fish.

- How many are young fish?
- What percent are adults?
- What percent are young fish?

3. Sam plays hockey for the Raiders.

Sam has taken 50 shots on goal in 20 games.

He scored 14 goals.

- What is his scoring percentage based on shots on goal?
- What is his scoring percentage based on the number of games played?

4. There are 50 Grade 6 students at Howard Avenue Public School.

6 were absent on Wednesday.

On that day, what percent were:

- absent?
- present?

5. 500 students attend Glen Grove School.

75 students sing in the senior choir.

200 students play intramural soccer.

25 students are members of the Drama Club.

30 students are members of the Library Club.

70 students are active members of the "Animal-Kindness" Club.

- What percent of the 500 students participate in each of these school activities?
- What percent do not participate?



# The Camping Trip

80% of the 70 Grade 6 students are going on the school camping trip. How many are going camping?

To solve:

*Step 1* Express the percent as a decimal.

$$\begin{aligned} 80\% &= \frac{80}{100} \\ &= 0.80 \\ &\text{or } 0.8 \end{aligned}$$

*Step 2* Calculate 80% of 70 as  $0.8 \times 70$ .

$$\begin{array}{r} 70 \\ \times 0.8 \\ \hline 56.0 \end{array} \quad \begin{array}{l} \text{56 students} \\ \text{are going camping.} \end{array}$$

Nicole's parents bought camping equipment costing \$48. How much money for sales tax did they pay if the sales tax rate was 5%?

To solve:

*Step 1* Express the percent as a decimal.

$$\begin{aligned} 5\% &= \frac{5}{100} \\ &= 0.05 \end{aligned}$$

*Step 2* Calculate 5% of \$48 as  $0.05 \times 48$ .

$$\begin{array}{r} 48 \\ \times 0.05 \\ \hline 2.40 \end{array} \quad \begin{array}{l} \text{Nicole's parents} \\ \text{paid \$2.40 for sales tax.} \end{array}$$



## Exercises

Calculate.

1. 50% of 18
2. 70% of 40
3. 10% of 80
4. 15% of 200
5. 25% of 60
6. 42% of 300
7. 66% of 150
8. 20% of 85
9. 90% of 500
10. 100% of 16
11. 6% of 150
12. 4% of 50
13. 2% of 300
14. 8% of 75
15. 1% of 400
16. 5% of 700
17. 3% of \$600
18. 7% of \$200
19. 9% of \$400
20. 5% of \$180
21. 65% of the Grade 6 students brought their own sleeping bags. How many students is this?
22. The price of Paul's sleeping bag was \$65. He had to pay 7% more for sales tax. What was the total cost of the bag?

# Allowances and Savings

Mario receives an allowance of \$5.50 per week. He puts 30% in his savings account. How much does he save each week?

**Step 1** Express 30% as a decimal.  
 $30\% = 0.30$  or  $0.3$

**Step 2** Calculate:  
 $0.3 \times \$5.50$

$$\begin{array}{r} 5.50 \text{ (2 decimal places)} \\ \times 0.3 \text{ (1 decimal place)} \\ \hline 1.650 \text{ (3 decimal places)} \end{array}$$

Mario saves  
**\$1.65** each  
 week.

Jean makes \$12.60 each week from her paper route. She saves 25% of her money. How much does she save each week?

**Step 1** Express 25% as a decimal.  
 $25\% = 0.25$

**Step 2** Calculate:  
 $0.25 \times \$12.60$

$$\begin{array}{r} 12.60 \text{ (2 decimal places)} \\ \times 0.25 \text{ (2 decimal places)} \\ \hline 6\ 300 \\ 25\ 200 \\ \hline 3.1500 \text{ (4 decimal places)} \end{array}$$

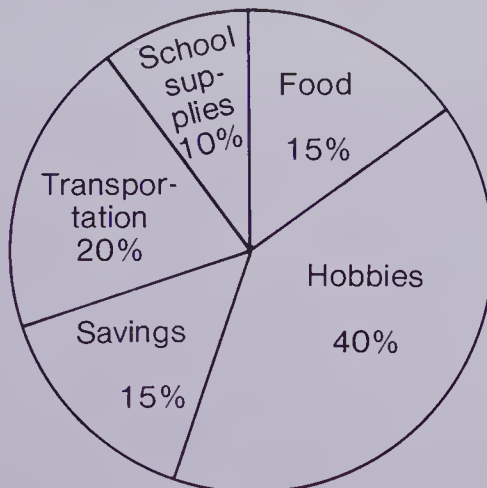
Jean saves  
**\$3.15** each  
 week.

## Exercises

Calculate.

1. 10% of \$32.00
2. 50% of \$79.00
3. 25% of \$11.60
4. 6% of \$45.00
5. 70% of \$54.50
6. 90% of \$35.00
7. 8% of \$9.50
8. 38% of \$60.00
9. 12% of \$4.50
10. 2% of \$83.00

11.



John receives an allowance of \$7.00 per week.

How much does he spend on:

- (a) school supplies?
- (b) transportation?
- (c) food?
- (d) hobbies?
- (e) How much does he save each week?



# Percents and Rounding

Some ratios produce decimals that need rounding when written as percents.

Ratio	Decimal	Percent	Rounded	
			(Whole %)	(Nearest tenth %)
$\frac{2}{3}$	$0.666 \dots$ $3 \overline{) 2.000}$	$66.666 \dots \%$	$(6)(6)(6)(6) \rightarrow 67.00$	$(6)(6)(6)(6) \rightarrow (6)(6)(7)(0)$
<hr/>				
$\frac{1}{7}$	$0.142857 \dots$ $7 \overline{) 1.00000}$	$14.2857 \dots \%$	$(1)(4)(2)(8)(5) \rightarrow (1)(4)(0)(0)$	$(1)(4)(2)(8)(5) \rightarrow (1)(4)(3)(0)$

## Exercises

Express each ratio as a decimal rounded to two decimal places.

1. (a)  $\frac{1}{3} = 3 \overline{) \begin{smallmatrix} \blacksquare \blacksquare \blacksquare \blacksquare \\ \blacksquare \blacksquare \blacksquare \blacksquare \end{smallmatrix}}$  (b)  $\frac{1}{8}$  (c)  $\frac{5}{8}$  (d)  $\frac{8}{9}$  (e)  $\frac{1}{11}$  (f)  $\frac{10}{11}$

2. Express each of the decimals in Exercise 1 as a percent rounded to the nearest whole percent.

3. Express each ratio as a percent rounded to the nearest tenth of a percent.

- (a)  $\frac{1}{12}$  (b)  $\frac{5}{12}$  (c)  $\frac{7}{11}$  (d)  $\frac{14}{15}$  (e)  $\frac{1}{14}$

4. Calculate the percent correct to the nearest whole percent:

- (a) Jill got 12 questions correct out of 13.  
(b) Allan got 49 questions correct out of 65.

## BRAINTICKLER

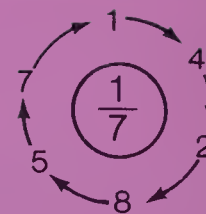
$$\frac{1}{7} = 0.142857$$

The line means that 142857 repeats.

$$\frac{1}{7} = 0.142857142857 \dots$$

(a) Express all the sevenths from  $\frac{1}{7}$  to  $\frac{6}{7}$  as decimals.

(b) Express each seventh as a percent rounded to the nearest whole percent.



# Stamp Collecting

40% of all the entries in the stamp-collectors' exhibition received prizes.  
What ratio of the entries received prizes?

**Step 1** Write the percent  
as a fraction.

$$40\% = \frac{40}{100}$$

**Step 2** Reduce, using division.

$$\frac{40 \div 10}{100 \div 10} = \frac{4}{10}$$

**Step 3** Reduce again  
(if necessary).

$$\frac{4 \div 2}{10 \div 2} = \frac{2}{5}$$

Two out of every 5 entries received prizes.



## Exercises

Express these percents as reduced ratios.

1.  $30\% = \frac{\blacksquare}{\blacksquare} = \frac{\blacksquare}{\blacksquare}$

2.  $60\% = \frac{\blacksquare}{\blacksquare} = \frac{\blacksquare}{\blacksquare} = \frac{\blacksquare}{\blacksquare}$

3.  $25\%$

4.  $10\%$

5.  $75\%$

6.  $80\%$

7.  $50\%$

8.  $12\%$

9.  $32\%$

10.  $48\%$

11.  $44\%$

12.  $56\%$

13.  $72\%$

14.  $84\%$

15.  $96\%$

16. 20% of Josh's stamps are Canadian stamps.  
What ratio of Josh's stamps are Canadian stamps?

17. 8% of his stamps are Dutch stamps.  
What ratio of his stamps are Dutch stamps?

18. 36% of his stamps are from African countries.  
What ratio of his stamps are African stamps?

19. 15% of his stamps are from the U.S.A.  
What ratio of his stamps are American?



# Tune Up

Copy and complete this chart of equivalents in your notebook.

	Ratio	Fraction ratio	Decimal	Percent
1.	7:10	■	■	■
2.	■	$\frac{4}{5}$	■	■
3.	■	■	0.75	■
4.	■	■	■	60%
5.	9:20	■	■	■
6.	■	$\frac{7}{25}$	■	■
7.	■	■	0.65	■
8.	■	■	■	8%
9.	■	$\frac{39}{50}$	■	■
10.	■	■	0.81	■



Score

25-30 Top shape

20-24 Good shape

Less than 20

More exercise required

Copy and complete this chart of equivalents.

(Round all decimals to 2 decimal places.)

(Round all percents to the nearest whole percent.)

	Ratio	Fraction ratio	Decimal	Percent
11.	7 out of 15	■	■	■
12.	■	$\frac{9}{16}$	■	■
13.	8 out of 11	■	■	■
14.	■	$\frac{5}{13}$	■	■
15.	23 out of 30	■	■	■



Score

12-15 Super shape

8-11 Good shape

Less than 8

More training required



# Boy Scout Day

Five Boy Scouts sold apples to raise money for their camping trip.



What was the average number of apples sold by each Scout?

To find average:

*Step 1* Add the total number of apples.

$$30 + 36 + 21 + 25 + 28 = 140$$

*Step 2* Divide by the number of Scouts.

$$\begin{array}{r} 28 \\ 5 \overline{)140} \\ \underline{10} \phantom{0} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

Each Scout sold an average of 28 apples.

## Exercises

Find the average of these sets of numbers.

1. 7, 12, 11

2. 10, 10, 7, 13

3. 40, 50, 55, 20, 35

4. 125, 75, 100, 100

5. 2, 4, 6, 1, 5

6. 187, 99, 142, 160, 157

Find the average of these sets of numbers. (Calculate all averages to the nearest tenth.)

7. 8, 12, 20, 18

8. 38, 47, 54, 73, 94

9. 327, 209, 252

10. 1725, 1620

11. 12, 17, 22, 6, 10, 15, 25, 17

12. 68, 55, 40, 81, 77, 72

13. Ten Girl Guides sold the following number of boxes of cookies to raise money for their activities.

12, 17, 28, 32, 9, 51, 19, 24, 15, 23

What was the average number of boxes sold by each Girl Guide?

# Averages

Tobi received the following marks on her report card:

66%, 72%, 58%, 90%, 77%, 79%, 82%, and 74%.

What was her average mark?

$$\begin{aligned}
 \text{Average} &= \frac{\text{total of marks}}{\text{actual number of marks}} \\
 &= \frac{66 + 72 + 58 + 90 + 77 + 79 + 82 + 74}{8} \\
 &= \frac{598}{8} \rightarrow \boxed{74.75} \rightarrow (7)(4).(7)5 - (7)5.(0)0 \\
 &= 75 \text{ rounded to the nearest whole percent}
 \end{aligned}$$

Tobi's average mark was 75%.



## Exercises

- Gary received the following marks on his second-term report card: 69%, 50%, 72%, 85%, 58%, 63%, 79%, and 75%. What was his average mark? (Round to the nearest whole percent.)
- Shots on goal during the six championship hockey games were 60, 82, 45, 58, 70, and 51. What was the average number of shots on goal per game?
- Steven worked for four nights on his school project. He worked for 85 min, 60 min, 45 min, and 90 min. What was the average length of time he worked per night?
- On a summer trip the Cargill family travelled 2448 km in six days. What was the average distance they travelled each day?
- County-fair attendance for seven days was 18 044 people. What was the average daily attendance? (Round to the nearest whole number.)
- Wendy received the following scores in figure skating: 5.8, 5.7, 5.5, 5.6, 5.7, and 5.9. What was her average score?

# Hot-Air Balloons

Hot-air balloons use propane burners to keep the air warm inside the balloon.

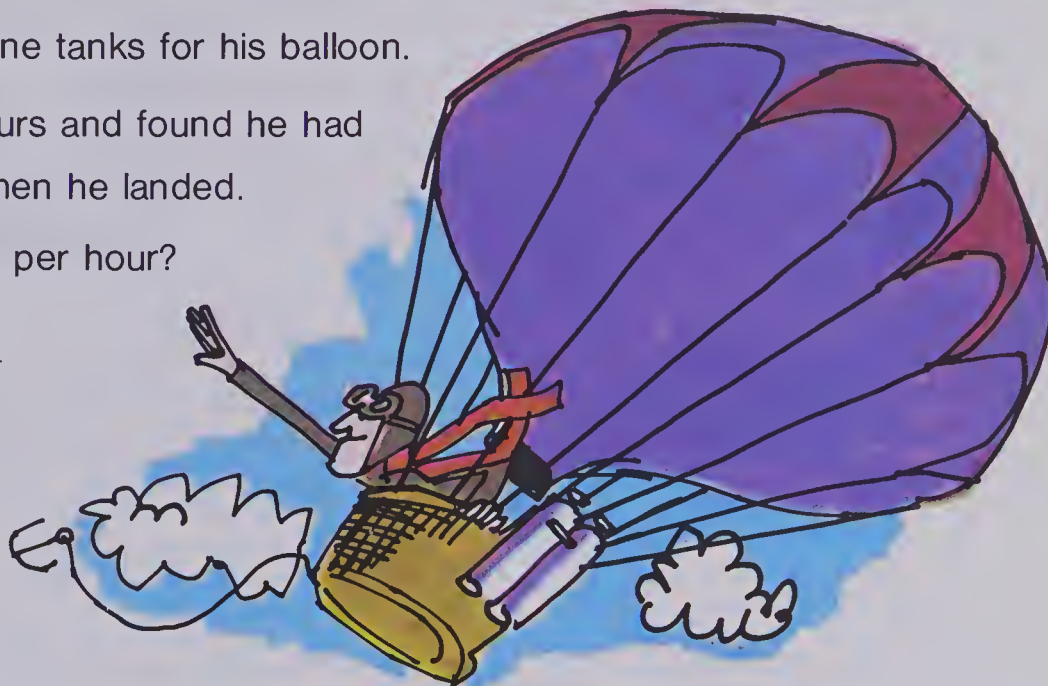
Mr. Russell has two full 90 L propane tanks for his balloon.

One Saturday, he flew for three hours and found he had 60 L of propane left in his tanks when he landed.

What was his average propane use per hour?

$$\begin{aligned}\frac{\text{Propane used}}{\text{Time in hours}} &= \frac{(2 \times 90) - 60}{3} \\ &= \frac{180 - 60}{3} \\ &= \frac{120}{3} \\ &= 40\end{aligned}$$

He used 40 L of propane per hour.



## Exercises

1. On a cold winter day, Mr. Russell used 108 L of propane for a four-hour flight. What was the average amount burned in each hour?
2. One morning Mr. Russell soared to a height of 1500 m in ten minutes. What was his average rate of ascent in metres per second?
3. Once in the sky, balloons travel at the speed of the prevailing winds. If the wind is blowing at an average of 32 km/h, how far would the balloon travel in 2.5 h?
4. Mr. Russell had to soar to 3000 m and then return to the ground to pass a test. He took 6 min to reach 3000 m, and 24 min to descend and land.
  - (a) What was his average rate of ascent in metres per second?
  - (b) What was his average rate of descent in metres per second?
  - ★(c) The prevailing winds were blowing at an average speed of 50 km/h. How far from his take-off spot did he land?

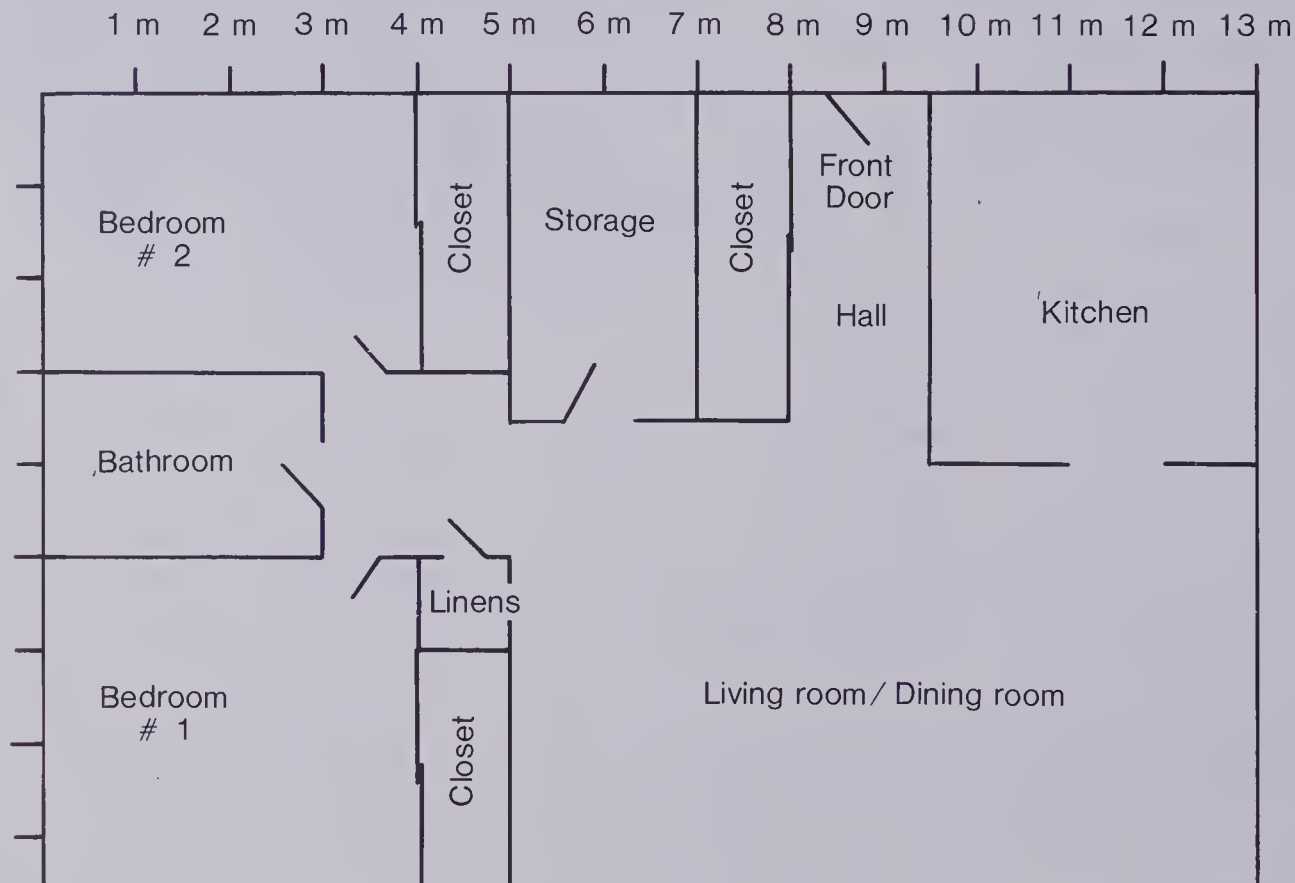


# The Architect

An architect drew some plans for an apartment.  
The scale ratio is

1 cm : 1 m

This means 1 cm on the drawing  
represents 1 m in the actual room.



The length of the living/dining room is 8 cm on the blueprint. This represents an actual length of 8 m in the full-sized apartment.

## Exercises

1. Find the actual dimensions of

- (a) kitchen
- (b) bedroom # 1
- (c) bedroom # 2
- (d) bathroom
- (e) storage room
- (f) closet in bedroom # 1
- (g) closet in bedroom # 2
- (h) linen closet



2. Trace bedroom # 1 in your notebook and draw to scale:

- (a) a bed that is 2 m by 1 m.
- (b) a rug that is 2 m by 2 m.
- (c) a dresser that is 1 m by 0.5 m.
- (d) a bookshelf that is 2 m by 0.25 m.



3. Trace another room in your notebook and draw in some furniture, using a scale factor of 1 cm : 1 m.

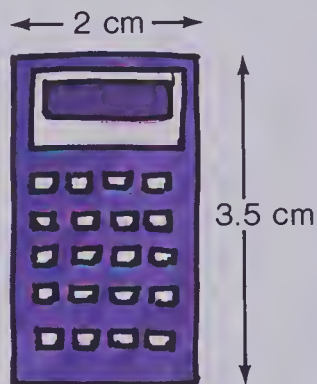




# Scale Drawings I

This is a scale drawing of a calculator.

What is its actual size?



Use the ratio:

$$\frac{\text{Drawing width}}{\text{Actual width}} = \frac{1}{4} = \frac{2}{\blacksquare}$$

$$1 \times \blacksquare = 4 \times 2$$

$$\blacksquare = 8$$

Scale ratio is 1:4.  
1 cm on the drawing  
represents 4 cm of  
actual length.

The actual width is 8 cm.

$$\frac{\text{Drawing length}}{\text{Actual length}} = \frac{1}{4} = \frac{3.5}{\blacksquare}$$

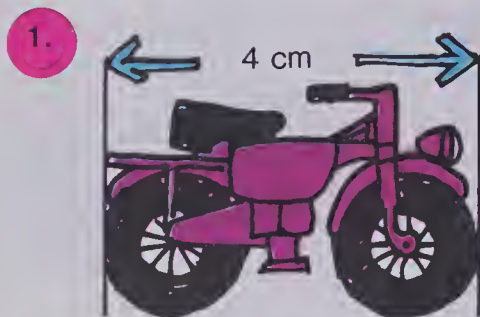
$$1 \times \blacksquare = 4 \times 3.5$$

$$\blacksquare = 14$$

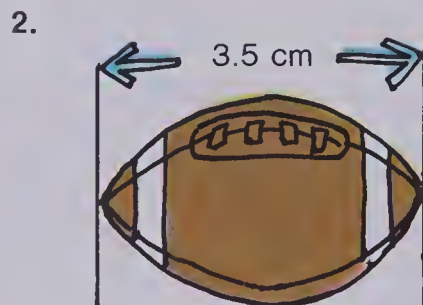
The actual length is 14 cm.

## Exercises

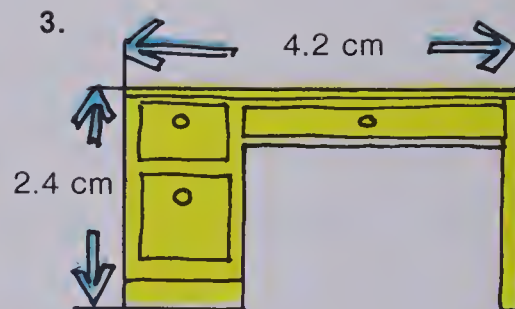
Use ratios to find actual sizes of these scale drawings.



1:50

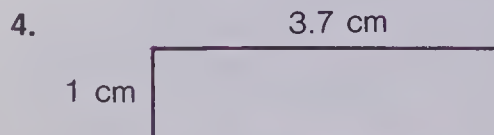


1:10

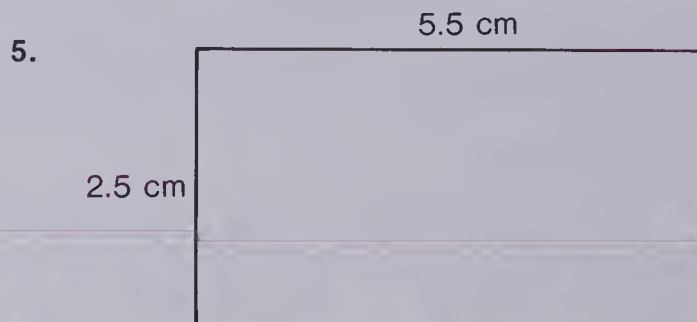


1:30

Measure and calculate the actual dimensions of these rectangles.



1:10



1:50



# Scale Drawings II

The dimensions of a standard briefcase are 45 cm × 30 cm.

To make a scale drawing of this using a scale ratio of 1:10, Rob had to calculate the drawing dimensions. He used ratios:

$$\frac{\text{Drawing width}}{\text{Actual width}} = \frac{1}{10} = \frac{\blacksquare}{30}$$

$$10 \times \blacksquare = 1 \times 30$$

$$10 \times \blacksquare = 30$$

$$\blacksquare = 3$$

The drawing width should be 3 cm.

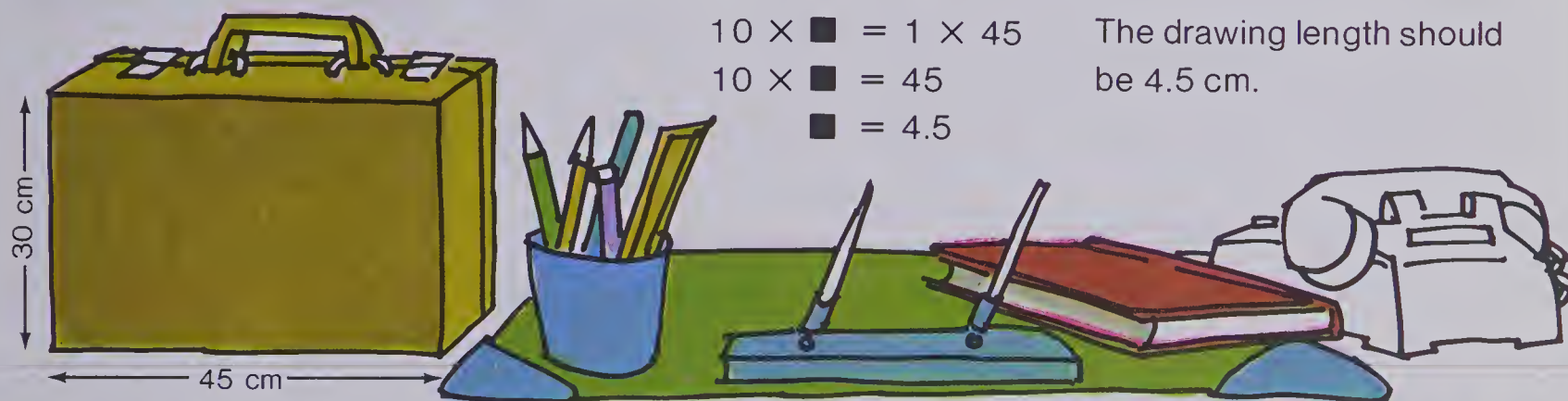
$$\frac{\text{Drawing length}}{\text{Actual length}} = \frac{1}{10} = \frac{\blacksquare}{45}$$

$$10 \times \blacksquare = 1 \times 45$$

$$10 \times \blacksquare = 45$$

$$\blacksquare = 4.5$$

The drawing length should be 4.5 cm.



## Exercises

Using a scale ratio of 1:10, make the following scale drawings.

1. a rectangle 20 cm by 30 cm
2. a square with sides 55 cm
3. a desk top 70 cm by 50 cm
4. an envelope 25 cm by 10 cm
5. a cupboard door 35 cm by 60 cm

Using a scale ratio of 1:20, make the following scale drawings.

6. an office-desk top 140 cm by 80 cm
7. a queen-sized bed 150 cm wide by 200 cm long
8. a coffee-table top 70 cm square
9. a poster 80 cm by 50 cm
- ★ 10. a rug 2 m by 3 m

## Activity

Make scale drawings of 4 objects in your classroom by using a scale ratio of 1:10 or 1:20.

# Chapter Test

1. Calculate cross products and state which pairs of ratios are equivalent.

(a)  $\frac{7}{5}, \frac{20}{15}$

(b)  $\frac{3}{5}, \frac{15}{25}$

(c)  $\frac{12}{15}, \frac{4}{5}$

(d)  $\frac{45}{30}, \frac{3}{2}$

2. Find the missing term in these equivalent ratios.

(a)  $\frac{1}{3} = \frac{\blacksquare}{12}$

(b)  $\frac{5}{8} = \frac{15}{\blacksquare}$

3. Copy and complete the following ratio chart.

Oranges	12	6	3			100
Total cost	96¢			120¢	200¢	

4. Express each as a percent.

(a)  $\frac{7}{20}$

(b)  $\frac{11}{25}$

(c)  $\frac{13}{50}$

(d) 0.42

(e) 0.06

(f) 0.8

5. Express each as a decimal.

(a) 75%

(b) 40%

(c) 4%

(d) 12%

(e) 9%

6. Express the percents in Exercise 5 as reduced ratios.

7. Express each ratio as a percent rounded to the nearest tenth.

(a)  $\frac{1}{3}$

(b)  $\frac{3}{8}$

(c)  $\frac{2}{7}$

8. Susan can swim 200 m in 4 min. How far can she swim in 6 min?

9. Find the average of the percents in Exercise 5.

10. Find:

(a) 40% of 300

(b) 8% of 50

(c) 10% of \$7.20

(d) 1% of \$320

11. Use a scale ratio of 1:20 to make a scale drawing of a wall map 50 cm by 80 cm.

# Cumulative Review

Write in expanded notation.

1. 72 826

2. 902 400

3. 389.25

Write as a numeral.

4. fourteen million, six hundred twenty-three thousand, eight hundred two

5. seventy-eight decimal two five

Perform the indicated operations.

$$\begin{array}{r} 6. \quad 793 \\ \times 85 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 238 \\ \times 100 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 321.7 \\ \times 6.4 \\ \hline \end{array}$$

9.  $4.83 \div 0.001$

10.  $0.31 \overline{)27.652}$

$$\begin{array}{r} 11. \quad \frac{7}{10} \\ + \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad \frac{7}{8} \\ - \frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 6\frac{2}{5} \\ + 2\frac{1}{6} \\ \hline \end{array}$$

14.  $\frac{3}{8} \times 4$

15.  $1\frac{3}{5} \times 3\frac{3}{4}$

16.  $10 \div \frac{2}{3}$

17.  $\frac{3}{5} \div 2$

Solve for  $n$ .

18.  $n + \frac{3}{4} = 1$

19.  $\frac{3}{8} = \frac{n}{24}$

20.  $\frac{n}{5} = \frac{12}{20}$

Find.

21. 20% of 30

22. 7% of 500

23. 50% of \$7.25

24. 5% of \$16.80

25. Record albums were on sale for 65% of their regular price.

What would the sale price be for an album that normally costs \$9.80?



# Chapter 9

# Applications

Bank Accounts and Interest

Sales Tax and Discounts

Equations and Problem Solving



# Tune Up

Add.

1.  $\$6.25 + \$9.32$

2.  $\$12.29 + \$7.97$

3.  $\$104.09 + \$38.75$

4.  $\$0.72 + \$2.53 + \$7.09$

5.  $\$35.92 + \$78.59$

6.  $\$183.79 + \$2.89$

Subtract.

7.  $\$1.75 - \$1.23$

8.  $\$3.82 - \$2.59$

9.  $\$9.12 - \$6.58$

10.  $\$24.38 - \$19.92$

11.  $\$57.95 - \$1.20$

12.  $\$138.85 - \$79.09$

13.  $\$10.00 - \$7.59$

14.  $\$20.00 - \$12.25$

15.  $\$100.00 - \$62.99$

Multiply.

16.  $\begin{array}{r} \$20.00 \\ \times 0.3 \\ \hline \end{array}$

17.  $\begin{array}{r} \$70.00 \\ \times 0.5 \\ \hline \end{array}$

18.  $\begin{array}{r} \$40.00 \\ \times 0.7 \\ \hline \end{array}$

19.  $\begin{array}{r} \$15.00 \\ \times 0.25 \\ \hline \end{array}$

20.  $\begin{array}{r} \$37.00 \\ \times 0.35 \\ \hline \end{array}$

21.  $\begin{array}{r} \$85.00 \\ \times 0.42 \\ \hline \end{array}$

22.  $\begin{array}{r} \$3.25 \\ \times 0.06 \\ \hline \end{array}$

23.  $\begin{array}{r} \$5.80 \\ \times 0.07 \\ \hline \end{array}$

24.  $\begin{array}{r} \$27.50 \\ \times 0.09 \\ \hline \end{array}$

Calculate. Round to the nearest cent when necessary.

25. 10% of \$60.00

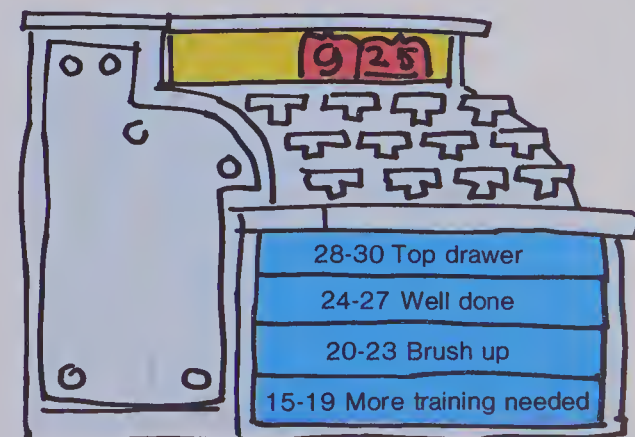
26. 15% of \$20.00

27. 25% of \$65.00

28. 2% of \$16.40

29. 6% of \$9.20

30. 5% of \$30.00



# Kevin's Bank Account

Kevin has a savings account at a local bank.

This is a page from his bankbook.

Date	Item	Withdrawals	Deposits	Balance
MAR. 01	Bal. Fwd.			50.72
MAR. 15			3.00	53.72
MAR. 19		7.50		46.22

Deposits are added.

$$\begin{array}{r}
 \$50.72 \\
 + \quad 3.00 \\
 \hline
 \$53.72
 \end{array}$$

Withdrawals are subtracted.

$$\begin{array}{r}
 \$53.72 \\
 - \quad 7.50 \\
 \hline
 \$46.22
 \end{array}$$

## Exercises

Copy and find the missing amounts.

1.

	Date	Item	Withdrawals	Deposits	Balance
	MAR. 10	Bal. Fwd.			72.37
(a)	MAR. 27		3.50		■
(b)	APR. 02			4.75	■
(c)	APR. 20		10.15		■

2.

	Date	Item	Withdrawals	Deposits	Balance
	FEB. 17	Bal. Fwd.			50.00
(a)	MAR. 01			10.00	■
(b)	MAR. 15		■		45.00
(c)	MAR. 30			■	57.50
(d)	APR. 27			20.17	■



3. Yvonne has a chequing account so that she can keep track of the money from her paper route. She keeps track of her own deposits and cheques in her bankbook.
- (a) Calculate the balance after each entry.

Date		Cheque No.	Particulars	Amount of Cheque	✓	Amount of Deposit	Balance
09	01		Balance Forward				72.45
09	05	—	Paper Collection			32.00	■
09	08	17	<i>Times-Examiner</i>	23.42			■
09	12	—	Paper Collection			33.00	■
09	15	18	<i>Times-Examiner</i>	24.15			■

- (b) What was the total amount collected during the two weeks in September?
- (c) What was the total paid to the *Times-Examiner* for papers?
- (d) How much did she make delivering papers for two weeks?

4. Calculate the balance after each entry.

Date 1980		Item	Initials	Withdrawals	Deposits	Balance
		Bal. Fwd.				72.37
01	17			3.50		■
01	30				4.00	■
03	15			10.00		■
04	05				2.00	■
04	19				7.25	■
05	20				5.50	77.62
06	19			15.00		■
07	03			10.50		■
07	30				60.00	■
08	10			4.25		■
08	30				70.00	■
09	07			18.00		■
10	15			■		140.35

Hint:  
03 15  
means  
March 15.

# Savings Accounts

When Brenda deposits \$100.00 in a non-chequing savings account that pays 9% interest per year, in a way she is lending her money to the bank. As a reward, the bank pays her interest.

How much interest would Brenda earn in one year?

*Step 1* Change 9% to  
a decimal.

$$9\% = 0.09$$

*Step 2* Find 9% of \$100.

$$\begin{array}{r} 100.00 \\ \times 0.09 \\ \hline 9.0000 \end{array}$$

In one year, she would earn \$9.00 interest.

Date			Item	Initials	Withdrawals	Deposits	Balance
80	04	30				100.00	100.00
81	04	30	INT.			9.00	109.00
82	04	30	INT.			9.81	118.81

## Exercises

Calculate the interest earned after one year on the following deposits.  
State the new balance after one year.

1. A \$100.00 deposit that earns 7% interest.
2. A \$500.00 deposit that earns 9% interest.
3. A deposit of \$100 000.00 from a lottery win that earns 10% interest.
4. A \$1 000 000.00 deposit that earns interest at the rate of 11% per year.

Copy and complete this page from Barry's bankbook.

The interest rate is 9%.

5.

Date			Item	Initials	Withdrawals	Deposits	Balance
80	03	01	Bal. Fwd.				200.00
81	04	30	INT.	AB		■	■
82	04	30	INT.	AB		■	■
83	04	30	INT.	AB		■	■

# Adam's Savings Bond

Buying a Canada Savings Bond is like lending money to the Canadian government. As a reward, the government pays interest.

Adam has a \$100 Canada Savings Bond that pays interest at an annual rate of 12%.

How much interest did he receive in one year?

*Step 1* Change 12% to a decimal.

$$12\% = 0.12$$

*Step 2* Find 12% of \$100.00.

$$\begin{array}{r} 100.00 \\ \times 0.12 \\ \hline 12.0000 \end{array}$$



He earned \$12.00 interest.

## Exercises

Calculate the interest for one year.

1. \$500.00 at 12%

$$\begin{array}{r} 500.00 \\ \times 0.12 \\ \hline \end{array}$$

2. \$200.00 at 10%

$$\begin{array}{r} 200.00 \\ \times 0.10 \\ \hline \end{array}$$

3. \$150.00 at 11%

4. \$800.00 at 10%

5. \$50.00 at 12%

6. \$350.00 at 11%

7. \$1000.00 at 10%

8. \$1000.00 at 14%

Calculate the interest earned or owed for one year.

9. Mr. Smith borrowed \$500.00 at 18% for one year.

10. Steven deposited \$300.00 in a 6% bank account for one year.

11. The Pender family borrowed \$16 000.00 at 15% for one year to buy a cottage.

12. The Hogon family borrowed \$6000.00 at 14% to purchase a new car.

13. George Bell purchased a \$200.00 Canada Savings Bond that pays interest at the rate of 12% per year.

★14. Kevin's sister earned \$11.00 on a \$100.00 bond last year. What was the interest rate?



# Provincial Sales Tax

Most provinces (and territories) charge **sales tax** on items purchased. Each province sets its own rate.

Mr. Gordon purchased a new coat for \$82.00.

The provincial sales tax rate was 7%.

(a) Calculate the sales tax.

(b) What was the total cost of the coat?

*Step 1* Calculate sales tax.

*Step 2* Calculate total cost of the coat.

$$7\% = 0.07$$

$$82.00$$

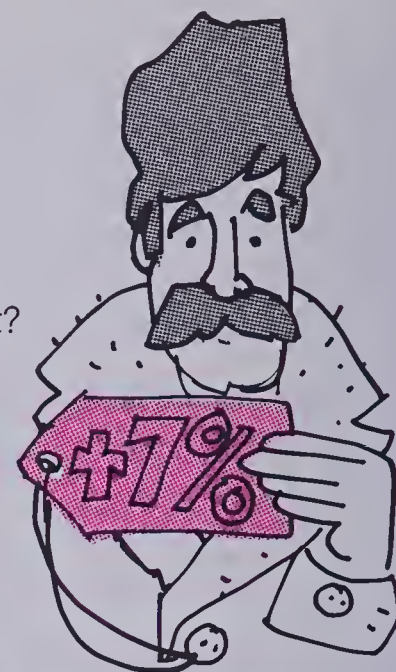
$$\times 0.07$$

$$\hline 5.7400$$

$$82.00$$

$$+ 5.74$$

$$\hline 87.74$$



The sales tax was \$5.74.

The total cost of the coat was \$87.74.

## Exercises

- What is the sales-tax rate in your province?
- Calculate the sales tax and total cost for each of these purchases.

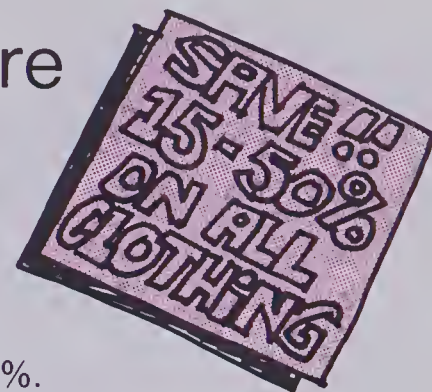
	Purchase Price	Sales-Tax Rate	Sales Tax	Total Cost
(a)	\$ 1.00	7%	\$ ■	\$ ■
(b)	\$ 5.00	7%	■	■
(c)	\$20.50	8%	■	■
(d)	\$ 3.75	4%	■	■
(e)	\$18.95	8%	■	■

- Tom bought the following clothing: a shirt for \$12.95, jeans for \$21.50, and a sweater for \$17.95. What was the cost of the clothing? How much did he pay if the sales-tax rate was 8%?

- ★ 4. The regular price of a new 10-speed bicycle is \$200.00. Calculate the total cost if the bicycle is on sale at a discount of 20%, and the sales-tax rate is 6%.



# Jenner's Department Store



Stores usually have sales to help bring in more business and compete with other stores. During sales, there are discounts off regular prices of some items.

The regular price of a calculator is \$13.00, and its discount rate is 20%. How much is the discount? What is the sale price?

Step 1 Calculate discount.

$$\begin{array}{r} 20\% = 0.20 \quad 13.00 \\ = 0.2 \quad \times \quad 0.2 \\ \hline 2.600 \end{array}$$

Step 2 Subtract.

$$\begin{array}{r} \$13.00 \\ - \quad 2.60 \\ \hline \$10.40 \end{array}$$

The discount is \$2.60.

The sale price is \$10.40.

## Exercises

Calculate the discount and sale prices for the following items.

1. Colour TV  
Regular \$500.00  
Save 20%

2. Jeans  
Regular \$19.00  
Save 30%

3. Posters  
Regular \$2.50  
Save 40%

4. Skates  
Regular \$55.00  
Save 15%

5. Track Shoes  
Regular \$18.00  
Save 10%


6. Round Trip by Air  
HALIFAX TO VANCOUVER  
Regular \$460.00  
Save 30%

7. Christmas Cards  
Save 60%

(a) Box of 12  
Regular \$2.50

(b) Box of 20  
Regular \$4.50

(c) Jumbo Deluxe  
Box of 50  
Regular \$6.50



8. Steak Dinner  
Regular \$7.50  
Monday Special  
Save 20%

9. Winter Coats  
Regular \$85.00  
Save 30%



# The Cashier

Angela Kapsalis is a cashier in a grocery store.  
She totals purchases, collects money,  
and returns the proper change to the customer.

Cash collected	→	\$80.00
Grocery bill	→	- 68.39
Change	→	<u>\$11.61</u>



## Exercises

Calculate the change.

- |   |  |  |  |   |
|---|--|--|--|---|
| 1. $\begin{array}{r} \$1.00 \\ - 0.79 \\ \hline \end{array}$    | 2. $\begin{array}{r} \$20.00 \\ - 11.98 \\ \hline \end{array}$ | 3. $\begin{array}{r} \$20.75 \\ - 13.75 \\ \hline \end{array}$ | 4. $\begin{array}{r} \$40.54 \\ - 13.75 \\ \hline \end{array}$ | 5. $\begin{array}{r} \$60.09 \\ - 42.84 \\ \hline \end{array}$  |
| 6. $\begin{array}{r} \$100.00 \\ - 86.75 \\ \hline \end{array}$ | 7. $\begin{array}{r} \$80.00 \\ - 72.20 \\ \hline \end{array}$ | 8. $\begin{array}{r} \$40.02 \\ - 32.52 \\ \hline \end{array}$ | 9. $\begin{array}{r} \$35.00 \\ - 34.71 \\ \hline \end{array}$ | 10. $\begin{array}{r} \$27.00 \\ - 26.07 \\ \hline \end{array}$ |
11. Mrs. Jakes buys meats for \$13.23, dairy products for \$4.39, vegetables for \$7.30, canned goods for \$16.83, and household supplies for \$9.82.  
What change would she receive if she gave the cashier three \$20 bills?
  12. Lee picked up 6 L of milk and two loaves of bread on the way home from school.  
The milk cost \$0.62/L and the bread cost \$0.97 a loaf.  
What change should he receive if he gives the cashier a \$10 bill?
  13. Brian purchased vegetables for \$6.30, dairy products for \$5.89, and frozen foods for \$9.63. He gave two \$20 bills to the cashier.  
What coins and bills might he receive in change?



# Choosing Equations



Two classes sold 180 spring-fair tickets. One class sold 105 tickets. How many did the other class sell?

Select the correct equation for the problem.

$$180 + 105 = n$$

$$180 - 105 = n$$

$$180 \times 105 = n$$

$$180 \div 105 = n$$



Choose this operation.

Solve the equation to answer the problem.

$$180 - 105 = n$$

$$75 = n$$

The other class sold 75 tickets.

Check for reasonableness:  
 Tickets of one class + tickets of other class = 180  
 105 + 75 = 180  
 Checks!

## Exercises

Select the correct equations, solve, and check for reasonableness.

1. Susan has \$0.35 and Jennifer has \$0.95. How much do they have together?

$$\$0.35 + \$0.95 = n$$

$$\$0.35 \times \$0.95 = n$$

$$\$0.35 - \$0.95 = n$$

$$\$0.35 \div \$0.95 = n$$

2. Jackie purchased school supplies for \$4.65. What change would she get from a \$10 bill?

$$\$10.00 + \$4.65 = n$$

$$\$10.00 \times \$4.65 = n$$

$$\$10.00 - \$4.65 = n$$

$$\$10.00 \div \$4.65 = n$$

3. \$300 was collected from the sale of tickets. Each ticket cost \$1.50. How many tickets were sold?

$$\$300 + \$1.50 = n$$

$$\$300 \times \$1.50 = n$$

$$\$300 - \$1.50 = n$$

$$\$300 \div \$1.50 = n$$

4. Cindy and Roger are an ice-skating team. They train 5 d a week for a total of 20 h. How long do they train each day?

$$20 + 5 = n$$

$$20 \times 5 = n$$

$$20 - 5 = n$$

$$20 \div 5 = n$$

# Solving Equations

$$\begin{aligned} 20 + 60 &= n \\ 80 &= n \end{aligned}$$

$$\begin{array}{r} 20 \\ + 60 \\ \hline 80 \end{array}$$

$$\begin{aligned} n + 95 &= 120 \\ 120 - 95 &= n \\ 25 &= n \end{aligned}$$

$$\begin{array}{r} 120 \\ - 95 \\ \hline 25 \end{array}$$

$$\begin{aligned} n \times 3 &= 21 \\ 21 \div 3 &= n \\ 7 &= n \end{aligned}$$

$$\begin{array}{r} 7 \\ 3 \overline{)21} \end{array}$$

Write  
related  
sentences.

$$\begin{aligned} 0.75 - 0.35 &= n \\ 0.40 &= n \end{aligned}$$

$$\begin{array}{r} 0.75 \\ - 0.35 \\ \hline 0.40 \end{array}$$

$$\begin{aligned} n - 80 &= 100 \\ 100 + 80 &= n \\ 180 &= n \end{aligned}$$

$$\begin{array}{r} 100 \\ + 80 \\ \hline 180 \end{array}$$

$$\begin{aligned} n \div 3 &= 20 \\ 20 \times 3 &= n \\ 60 &= n \end{aligned}$$

$$\begin{array}{r} 20 \\ \times 3 \\ \hline 60 \end{array}$$

## Exercises

Solve.

1.  $12 + 8 = n$   
 $\blacksquare = n$

2.  $50 - 20 = n$   
 $\blacksquare = n$

3.  $n + 20 = 50$   
 $50 - \blacksquare = n$   
 $? = n$

4.  $n - 10 = 60$

5.  $n + 25 = 100$

6.  $n - 100 = 5$

7.  $n + 83 = 142$

8.  $n + 73 = 195$

9.  $n - 452 = 82$

10.  $n + n = 20$

11.  $n \times 4 = 20$

12.  $n \times 8 = 72$

13.  $n \div 5 = 8$

14.  $n \div 2 = 23$

15.  $n \times 9 = 108$

16.  $n \div 10 = 1$

17.  $n \times 12 = 60$

18.  $n \times 20 = 240$

19.  $n \div 15 = 20$

20.  $0.15 + 1.21 = n$

21.  $n + 1.5 = 3.7$

22.  $n - 2.7 = 9.2$

23.  $n + 5.6 = 9.9$

24.  $n - 3.9 = 12.1$

25.  $n \div 0.5 = 8$

26.  $n \times 1.5 = 13.5$

27.  $n \times 0.5 = 2.5$

Write equations and solve.

28. Sara has saved \$22.50.  
New skates cost \$45.90.  
How much more money must Sara  
save in order to buy the skates?

29. Russell saved \$3.50 each month for  
a year. He has enough money to buy  
new roller skates.  
What do the roller skates cost?

# The Derby

In a soapbox derby, Elliot's time was 27.2 s.

Lauren's time was 1.9 s longer.

How long was Lauren's run?

Think:

Lauren's time = Elliot's time + extra time

Write an equation.

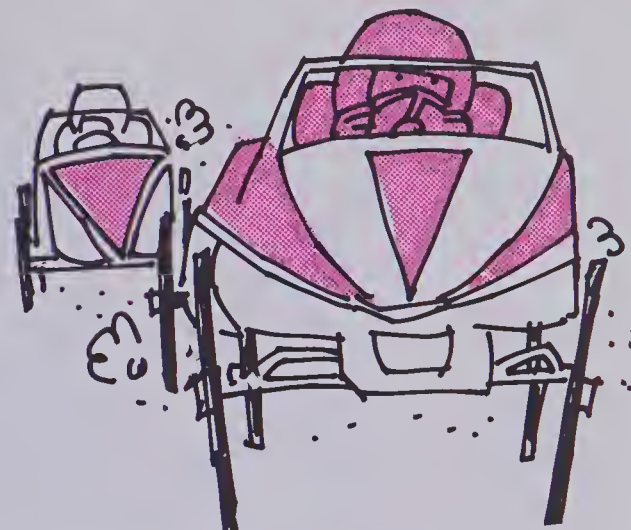
$$n = 27.2 + 1.9$$

Solve.

$$n = 29.1$$

Write a sentence.

Lauren's run was 29.1 s.



## Exercises

Write an equation for each problem. Solve the problem.

- Betty's time for the race was 29.9 s.  
Zella's time was 0.5 s longer.  
How long was Zella's run?
- Helen's race time was 30.6 s.  
Jackie's time was 0.9 s longer.  
How long was Jackie's run?
- Bruno's car is 1.60 m long.  
Kathleen's car is 0.12 m shorter.  
How long is Kathleen's car?
- Fred's car is 1.8 m long.  
Irvine's car is 0.01 m shorter.  
How long is Irvine's car?
- Bea spent \$2.40 for repairs to her car.  
Irene spent 3 times as much to repair her car.  
How much did Irene spend?
- Jim spent 2.5 h painting his car.  
Gladys took twice as long to paint her car.  
How much time did Gladys spend painting?





# Professor Q Visits Glendale School

Professor Q noted that the 9 classes at Glendale School collected \$477 for the zoo fund. What was the average amount collected by each class?

To find the solution, use Professor Q's four steps.

Step 1 Find:

- |                  |  |
|------------------|--|
| (a) main idea    | Collecting money for zoo fund                        |
| (b) the question | What was the average amount collected by each class? |
| (c) the facts    | \$477 collected by 9 classes                         |
| (d) an operation | division   |

Step 2 Write an equation.  $477 \div 9 = n$

Step 3 Solve the equation.

	53	
9	$\overline{)477}$	
	45	
	<hr/>	
	27	$477 \div 9 = 53$
	27	
	<hr/>	
	0	

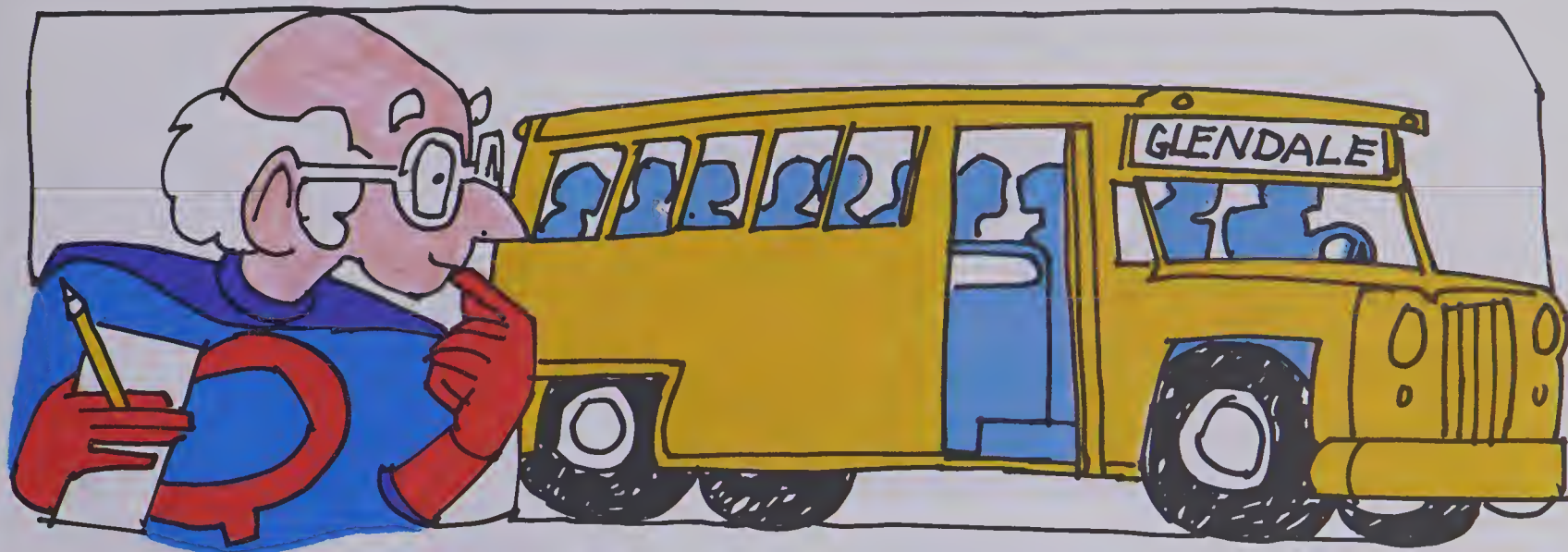
Step 4 Write a statement.

Each class collected an average of \$53 for the zoo fund.



## Exercises

1. The library has 104 full shelves of books, and each shelf holds 36 books. How many library books are in the Glendale library?
2. The storeroom in the gymnasium contains 96 balls. A quarter of the balls are basketballs. How many basketballs are in the storeroom?
3. The school photographer spent 3 h taking class pictures of the 9 classes of students. How many minutes did he spend photographing each class?



4. The Glendale School baseball team won 16 games and lost 4 games to win the county championship.  
What percent of all the games did the team win?
5. The girls' volleyball team played 10 games and won 70% of them to finish second in the county.  
How many games did they win?  
How many games did they lose?
6. There are 280 students at Glendale School, and the average attendance is 95%.  
On an average day, how many students are absent?
7. There are 153 students in the senior classes at Glendale School, and each student requires 12 notebooks per year.  
If the principal orders 2000 notebooks, will there be enough to last for the year for the senior classes?
- ★ 8. Glendale School has 38 students in the senior choir and 32 students in the junior choir.  
There are 280 students in the school.  
What percent of the students are members of choirs?
- ★ 9. How many buses are required to take the 280 students on field trips?  
A bus holds exactly 52 people.  
How many seats are available for teachers and parents?

# Hans' Stereo System

Hans decided to put a stereo system in his room.

He bought a stereo set, four speakers, and 8 m of speaker wire.

The stereo set cost \$399. Each speaker cost \$140, and a metre of wire cost \$0.49.

How much did Hans spend in all?

Step 1 Cost of speakers:  $4 \times \$140.00 = \$560.00$

Step 2 Cost of 8 m of wire:  $8 \times \$0.49 = \$3.92$

Step 3 Cost of all items:

\$560.00
3.92
+ 399.00
<hr/>
\$962.92



The total amount Hans spent was \$962.92.

## Exercises

- Hans needed 24 connectors, 1 tape deck, and 6 cassettes.

The connectors cost \$0.40 each. The tape deck cost \$156.00.

The cassettes cost \$4.25 each. How much did all the items cost?

Step 1 Cost of connectors

Step 2 Cost of 6 cassettes

Step 3 Total cost of connectors, cassettes, and tape deck

- Hans' brother bought Hans 3 cassettes and 2 record albums.

The cassettes cost \$3.95 each. The record albums cost \$7.50 each.

How much did Hans' brother spend altogether?

- Hans' mother bought 10 records. They were 2 for \$12.00.

She also bought a cassette for \$5.60. How much did she spend altogether?

Step 1 Number of sets of 2 she bought (■)

Step 2 Cost of ■ sets of records

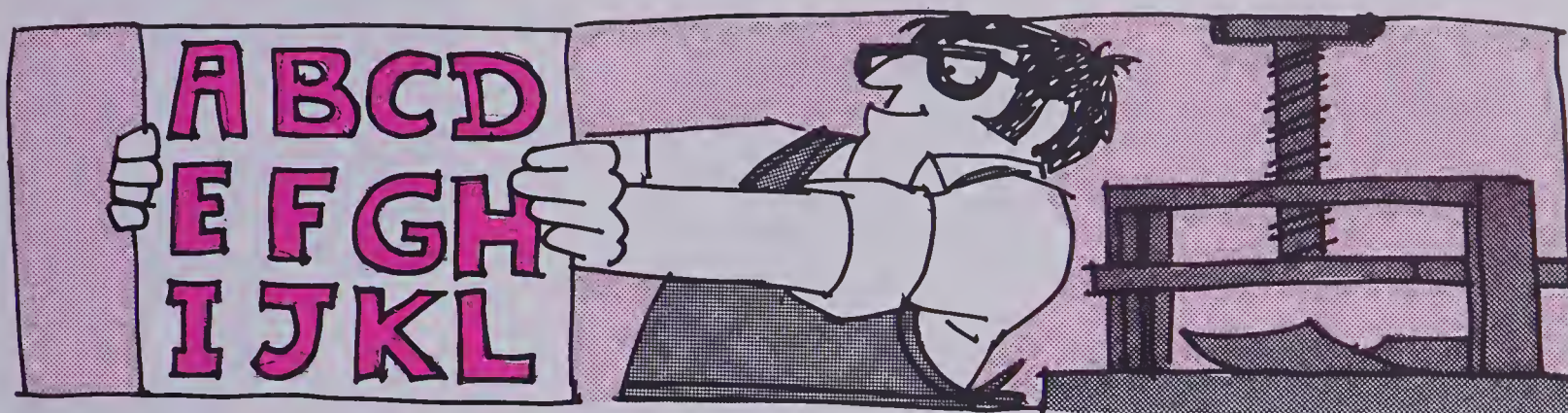
Step 3 Cost of records and cassette

- Hans bought 4 albums at \$10.19 each and 1 cassette at \$6.19. He gave the clerk \$60.

How much change did he get back?



## Typesetter



1. Mr. Neilson set 21 pages of type in 3 h.  
He worked at a steady rate.  
How many pages did he set in 1 h?
2. Ms. Carlos had 17 pages to set for one book and 46 pages to set for another book.  
She has done 19 pages.  
How many more pages does she still have to set?
3. Mrs. O'Hare has worked 2 h overtime 3 times this week and 3 h overtime  
4 times last week.  
How many overtime hours has she worked in two weeks?
4. Mr. Elliott has 190 pages to proofread in 5 h.  
How many pages each hour must he check in order to finish on time?
5. Mr. Elliott found 5 errors on each of 8 pages, 4 errors on each of 6 pages,  
and 2 errors on one page.  
What was the total number of errors?
6. There were 43 lines of type to each page of a paperback book.  
Each line contained an average of 8 words.  
Approximately how many words on:  
(a) 18 pages?                      (b) 30 pages?                      (c)  $21\frac{1}{2}$  pages?

# Bike Hikes

Tom and Cathy can travel at 15 km/h on their bicycles.  
How long would it take to travel 45 km to the conservation area?



$$\begin{array}{r} 3 \\ 15 \overline{)45} \\ \underline{45} \\ 0 \end{array}$$

km/h  
means  
kilometres  
per hour.

Set up equivalent ratios.

$$\frac{15}{1} = \frac{45}{\blacksquare}$$

Cross products

$$15 \times \blacksquare = 1 \times 45$$

$$\blacksquare \times 15 = 45$$

Related division sentence

$$45 \div 15 = \blacksquare$$

$$3 = \blacksquare$$

It would take 3 h.

## Exercises

- At 15 km/h, how long would it take Tom and Cathy to cycle to Tom's cottage, which is 30 km from town?
- At 15 km/h, how many minutes would it take to travel to Cathy's cousin's home, which is 6 km away?
- Tom's father can average 80 km/h travelling by car.  
How long would it take to drive (round to 1 decimal place):
  - 400 km?
  - 200 km?
  - 120 km?
  - 100 km?
- At an average speed of 14 km/h, how far could Tom and Cathy cycle in:
  - 2 h?
  - 5 h?
  - 3.5 h?
  - 2.5 h?
  - 4 h and 30 min?
  - 15 min?
- In a recent "bike-a-thon" to raise money for charity, Tom completed the 30 km course in 1.5 h.  
What was his speed in kilometres per hour?
- Cathy completed the same 30 km course in 1 h 15 min.  
What was her speed in kilometres per hour?



# Running

A cheetah can run at 110 km/h over short distances.

At this rate, how long would it take a cheetah to run 11 km?

Set up equivalent ratios.  $\frac{\text{Distance}}{\text{Time}} \rightarrow \frac{110}{60} = \frac{11}{\blacksquare}$

Remember:  
1 h = 60 min

Cross products

$$110 \times \blacksquare = 60 \times 11$$

$$110 \times \blacksquare = 660$$

Related division sentence

$$\blacksquare = 660 \div 110$$

$$\blacksquare = 6$$

The cheetah would take 6 min to run 11 km.



## Exercises

1. Squirrels can travel at 18 km/h.

At this rate, how long (in minutes) would it take to travel 9 km?

2. Grizzly bears can travel at 48 km/h.

At this rate, how long (in minutes) would a grizzly bear take to run:

- (a) 16 km?                      (b) 24 km?                      (c) 4 km?

3. Lions can travel at 80 km/h.

At this rate, how long (in minutes) would a lion take to run:

- (a) 40 km?                      (b) 20 km?                      (c) 16 km?

4. Elephants can travel at 40 km/h.

At this rate, how long would an elephant take to run:

- (a) 80 km?                      (b) 10 km?                      (c) 2 km?

5. A good marathon runner can travel at 16 km/h.

At this rate, how long would it take to run:

- (a) 32 km?                      (b) 40 km?                      (c) 24 km?                      (d) 8 km?                      (e) 4 km?

- ★ 6. A garden snail can move at a rate of 0.05 km/h.

At this rate, how many hours would it take a snail to cover one kilometre?





# Still Running

A sprinter can run at a speed equivalent to 15 km in 20 min over short distances.  
What is the sprinter's speed in kilometres per hour?

Set up equivalent  
ratios for

$$\frac{\text{Distance}}{\text{Time}} \rightarrow \frac{15}{20} = \frac{\blacksquare}{60}$$

Cross products

$$20 \times \blacksquare = 15 \times 60$$

$$20 \times \blacksquare = 900$$

Related division sentence

$$\blacksquare = 900 \div 20$$

$$\blacksquare = 45$$

It  
works!

$$\frac{15}{20} = \frac{45}{60}$$



The sprinter's speed is 45 km/h.

## Exercises

(The data in these problems are based on speeds reached in runs less than 0.5 km.)

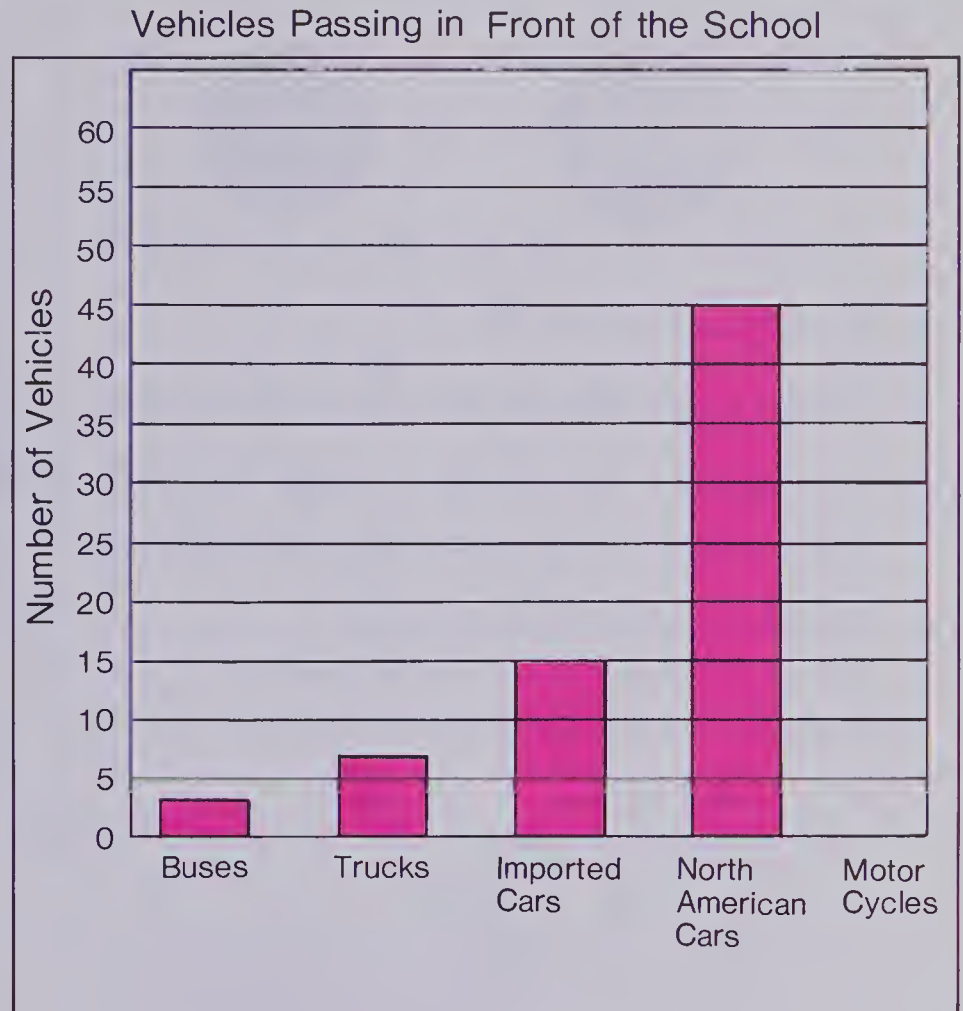
Calculate the speed of each animal in kilometres per hour.

1. A quarter horse can run 5 km in 15 min.
2. A zebra can travel 16 km in 15 min.
3. A wild turkey can run 2 km in 5 min.
4. A pig can cover 4 km in 15 min.
5. A wildebeest can cover 4 km in 3 min.
6. An elephant can run 20 km in 30 min.
7. A cat can run 8 km in 10 min.
- ★ 8. A giant tortoise can cover 1 km in 4 h.
- ★ 9. A three-toed sloth can cover 1 km in 6 h.



# Predictions

1. Vern and Joyce counted the number of vehicles passing in front of their school in 45 min.  
This is their graph.
  - (a) What information does this graph show?
  - (b) If you went to the front of the school, which type of vehicle would probably pass by first? Explain why you think so.
  - (c) What season was it when Vern and Joyce did their survey?  
Explain why you think this.
  - (d) Describe the street in front of the school.



2. The city hockey league kept statistics on its teams.  
A team earns 2 points for a win and 1 point for a tie.

County Hockey League

	Wins	Ties	Losses	Points
Trojans	17	2	11	36
Warriors	12	0	18	■
Bears	15	1	14	■
Saints	21	3	6	■
Lions	10	2	18	■
Hurricanes	8	6	16	■

- (a) Copy this chart in your notebook and calculate each team's points.
- (b) Make a bar graph of your results.
- (c) Rank the teams.
- (d) If these teams played, predict the winner:
  - (i) the Warriors and the Saints
  - (ii) the Bears and the Trojans
  - (iii) the Lions and the Hurricanes
 Explain each prediction.

# Coins and Pencils

A coin has two sides:



Result	Tally	Number
Heads		
Tails		
Total		20

1. Toss a coin 20 times and record the results.
2. Explain your results.
3. Compare your results with the results of someone else in your class.

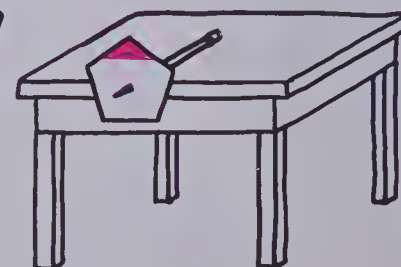
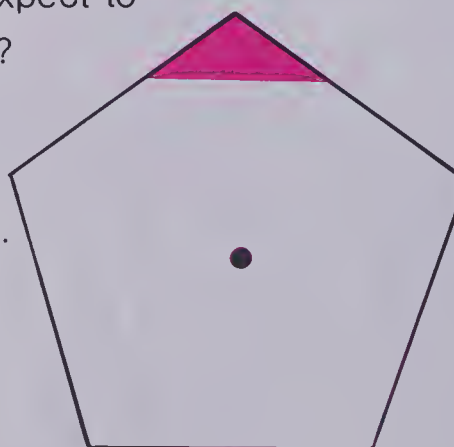
A hexagonal-sided pencil or pen usually has printing on one face and none on the other faces.

4. Roll the pencil across your desk 30 times and record the results.
5. How many sides have printing?  
How many sides do not have printing?  
How many sides are there altogether?

Results	Tally	Number
Printing on top side		
Printing not on top side		
Total		30

6. What is the ratio of:
  - (a)  $\frac{\text{sides with printing}}{\text{total number of sides}}$  ?
  - (b)  $\frac{\text{sides without printing}}{\text{total number of sides}}$  ?
7. (a) How many rolls out of 60 would you *expect* to have printing on the top side?  
(b) How many rolls out of 60 would you expect to have a side without printing on the top?

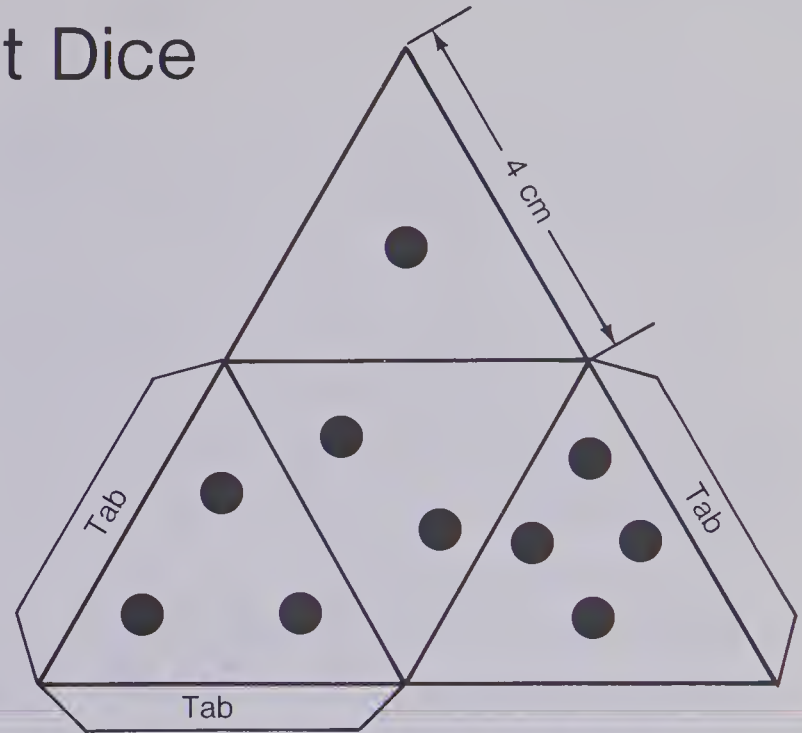
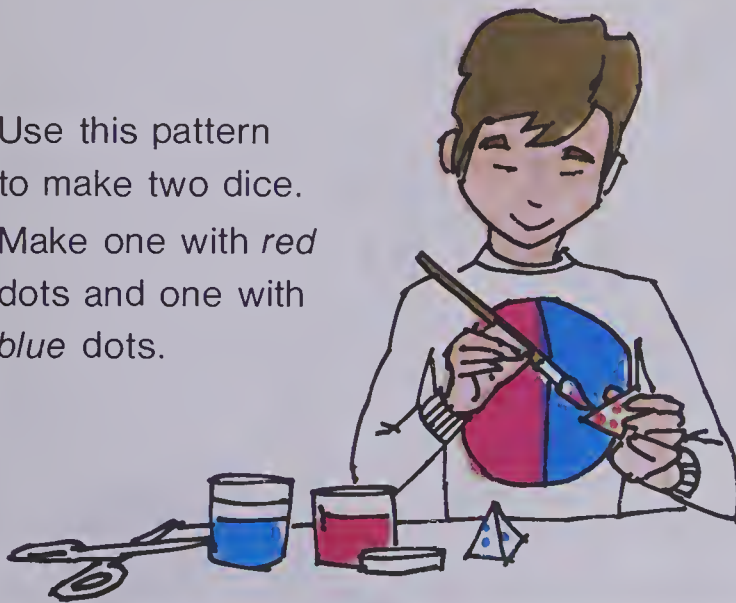
8. Make this pentagon out of paper.  
Colour one vertex.  
Put a round pencil point through the middle.
  - (a) Predict the number of times the red vertex will be up out of 20 rolls.
  - (b) Now roll the shape 20 times. Record your findings on a chart.





# Different Dice

Use this pattern to make two dice.  
Make one with *red* dots and one with *blue* dots.



## Exercises

When rolling and listing results for tetrahedron dice, record the number for the side that lands face down.

1. When one die is rolled there are  $\blacksquare$  possible results.

List the results.

2. When a pair of dice are rolled there are 16 possible results. Copy this chart and record the possible results.

+				

3. What is the smallest sum you can roll?
4. What is the largest sum you can roll?
5. How many ways can you roll each of the sums? Record on a chart.
6. Which sum occurs most often?
7. Which sums would occur least often?

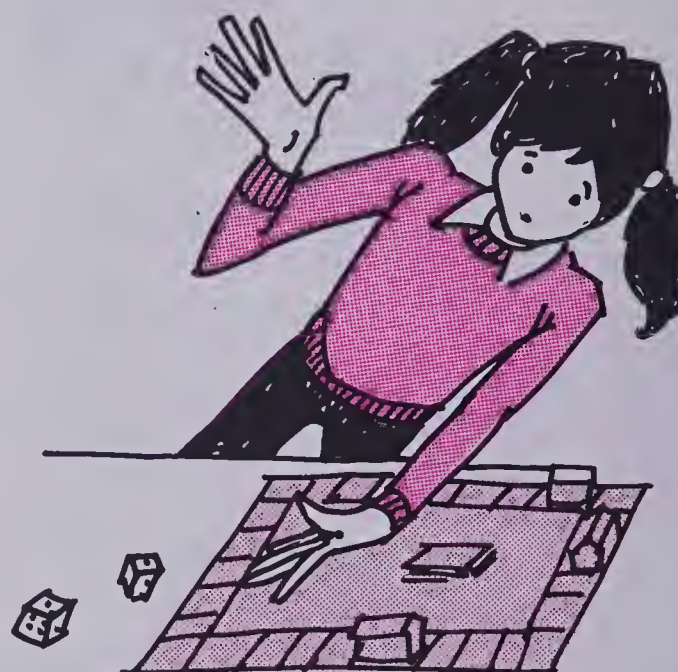
# Dice

When a single die is thrown, there are 6 possible results.  
They can each be thrown only one way.



When a pair of dice are rolled, there are 36 possible combinations as shown on the chart listing the sums.

		Yellow Die					
White Die	+	•	• •	• • •	• • • •	• • • • •	• • • • • •
	•	2	3	4	5	6	7
	• •	3	4	5	6	7	8
	• • •	4	5	6	7	8	9
	• • • •	5	6	7	8	9	10
	• • • • •	6	7	8	9	10	11
	• • • • • •	7	8	9	10	11	12



## Exercises

Refer to the chart above to answer these questions.

1. What is the smallest sum you can roll?
2. How many ways can you roll the smallest sum?
3. What is the largest sum you can roll?
4. How many ways can you roll the largest sum?





5. How many ways can you roll each of the following sums?
- |        |        |        |       |
|--------|--------|--------|-------|
| (a) 2  | (b) 3  | (c) 4  | (d) 5 |
| (e) 6  | (f) 7  | (g) 8  | (h) 9 |
| (i) 10 | (j) 11 | (k) 12 |       |
6. Which sum occurs the most often?
7. Which three sums are easiest to roll, using a pair of dice?
8. Which two sums are hardest to roll?
9. If you were playing a board game using dice, how far away from the jackpot would you prefer to be? Why?
10. (a) When playing board games using dice in which one player captures another player, how far away from your opponent would you prefer to be? (3 or 4 answers)  
 (b) At what distances would you be in most danger of being captured? (3 answers)

### Activity

Roll a pair of dice 36 times and record the sums on this chart.  
 Compare this with your answers to Exercise 5.

Sum	Tally
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

## BRAINTICKLER

20 black socks and 20 brown socks are in a pile. The room is dark.  
 How many socks must you pick to be sure you have a matched pair?





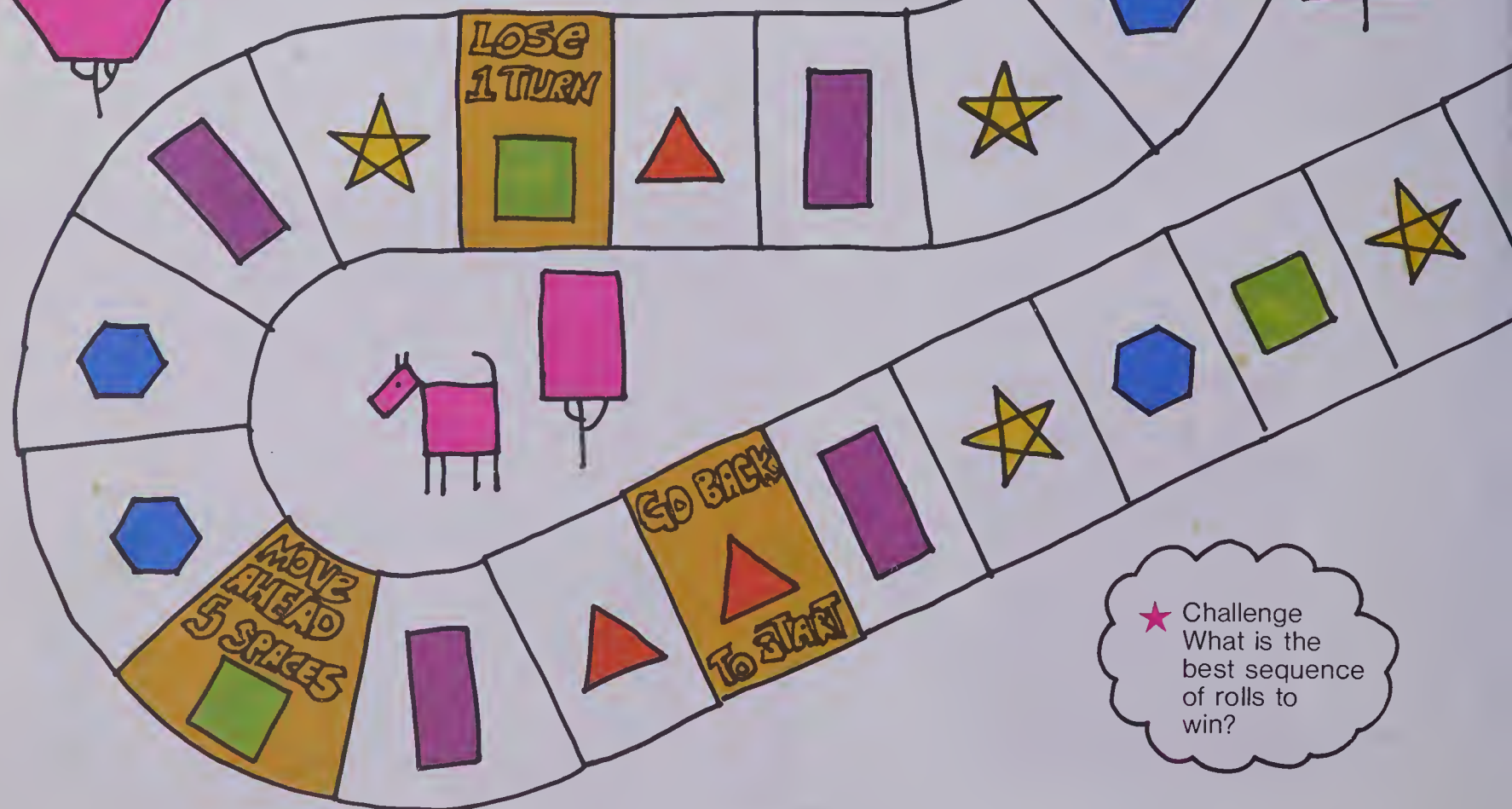
# Shape Race



Make this die with shapes as shown.

## Rules

1. Flip a coin to see who goes first.
2. First player rolls the die and moves along the board and stops at the shape rolled:

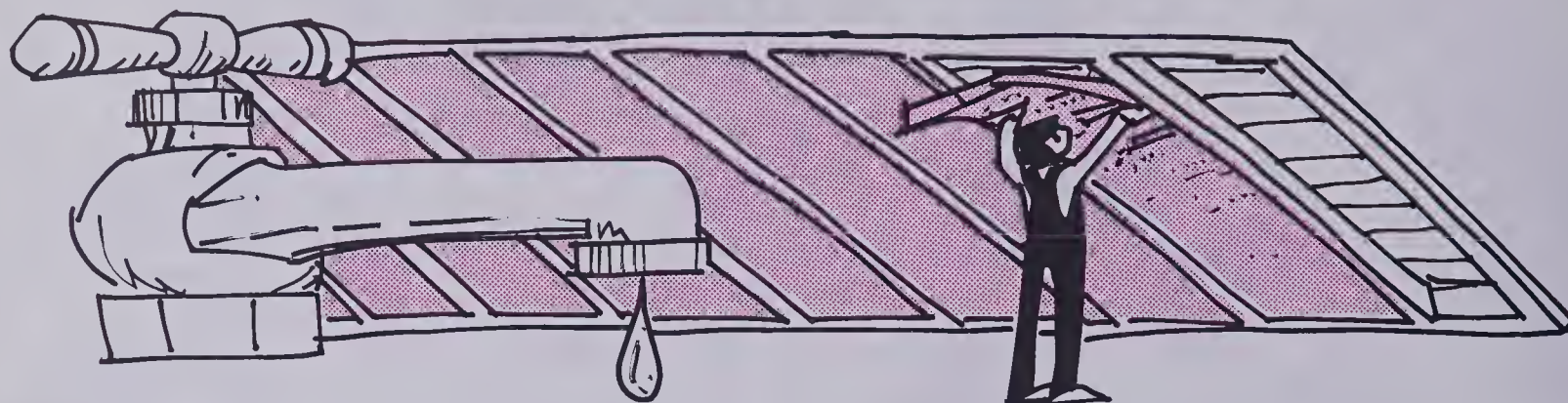


★ Challenge  
What is the best sequence of rolls to win?





# Conservation at Home



## Water

1. A leaking water tap may drip 0.6 L each hour.
  - (a) How much water would drip away in a day?
  - (b) How much water would be saved in a year (365 d) if this leaky tap were repaired?
2. A tub bath uses 3 times as much water as a shower.
  - (a) If an average family used 27 000 L of water for tub baths each year, how much water would the family use if they all took showers instead?
  - (b) How much water would they save in a year by taking showers?
3. A toilet uses 15 L of water each time it is flushed. An average family flushes the toilets 20 times each day.
  - (a) How much water is used each day?
  - (b) How much water is used each year?
  - (c) Some toilets can be adjusted to use 70% of the normal flush.  
How much water could be saved in a year by adjusting the toilet?

## Energy

4. A well-insulated house saves 40% on heat-energy charges as compared to a poorly insulated house.  
How much money would a family save by better insulation if their yearly heat-energy charges are:
  - (a) \$800/a?                      (b) \$1100/a?                      (c) \$1550/a?                      (d) \$1960/a?



5. Setting the thermostat at  $18^{\circ}\text{C}$  instead of  $21^{\circ}\text{C}$  at night and when no one is at home will save a further 9% in heat-energy charges.

What would be the saving in a well-insulated house if the heat-energy charges are:

- (a) \$500/a?                      (b) \$620/a?                      (c) \$870/a?

6. Families can save 20% on the electrical bill by turning off lights when leaving rooms, deciding what is required from the refrigerator before opening the door, and turning the TV off when no one is watching it.

How much would a family save by following these three tips if their yearly electricity bill is:

- (a) \$350?                      (b) \$410?                      (c) \$530?

7. The family car will use 18% less gasoline if it is well tuned, the driver does not exceed 90 km/h, and the driver speeds up slowly.

How much would be saved each year by following these tips if the annual gas cost is:

- (a) \$700?                      (b) \$950?                      (c) \$1230?

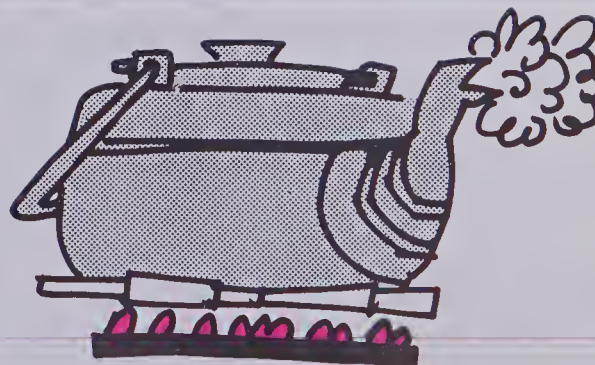


### Activity

Research energy conservation under one of these topics:

- (a) heating and insulation  
(b) electricity consumption  
(c) transportation and gas consumption

List 6 ways of conserving energy.



# Insurance Agent



1. Last year Mr. Yellowfeather's auto insurance cost \$450. Since he has a safe driving record he will save 10% this year.
  - (a) How much will he save?
  - (b) How much will his insurance cost this year?
2. Mrs. Trevor sold the Angelo family a health-insurance policy. The monthly cost is \$7.20. What is the annual cost?
3. Ms. Kim insures her house with the same company that carries her car insurance. The special rate for the house is \$2.50 per \$1000 of its value. Her house is valued at \$60 000. What is the cost of the house insurance?
4. An insurance company paid 0.86 of the insured value of a house following a fire. The house was insured for \$55 000. How much was paid to the owner?
5. Mrs. Trevor sold 156 policies in 1979. In 1981 she sold 2.6 times as many. How many new policies did she sell in 1981?
6. In a certain city there were 32 000 accident claims in one year. The next year there were 1.26 times as many. How many claims were there in the second year?

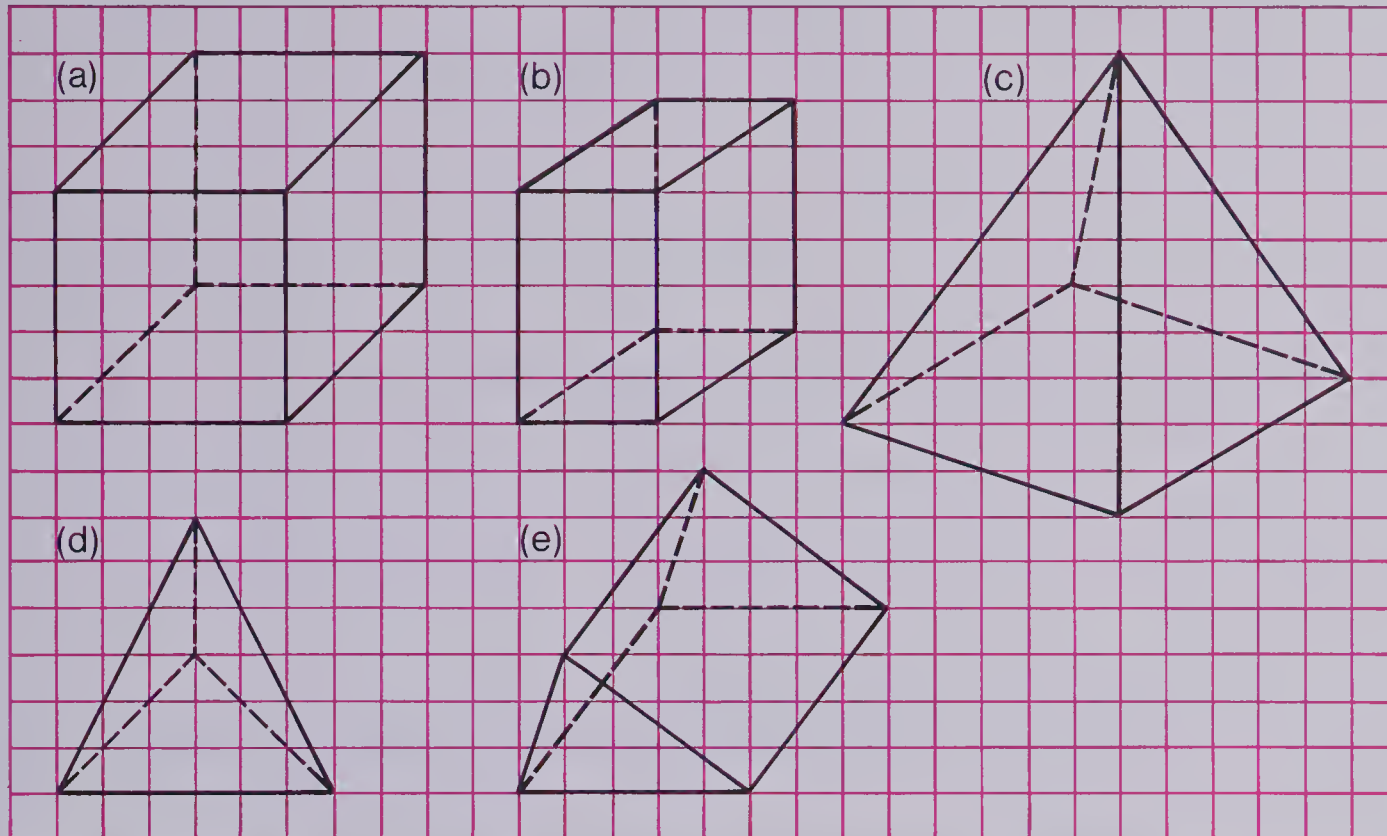


# Drawing on Graph Paper

1. We can use graph paper to help us draw three-dimensional shapes on two-dimensional surfaces.

Copy each shape on graph paper. Name the shapes.

The dotted lines show hidden edges.



2. Draw 4 three-dimensional shapes of your own design on graph paper.

## Activity

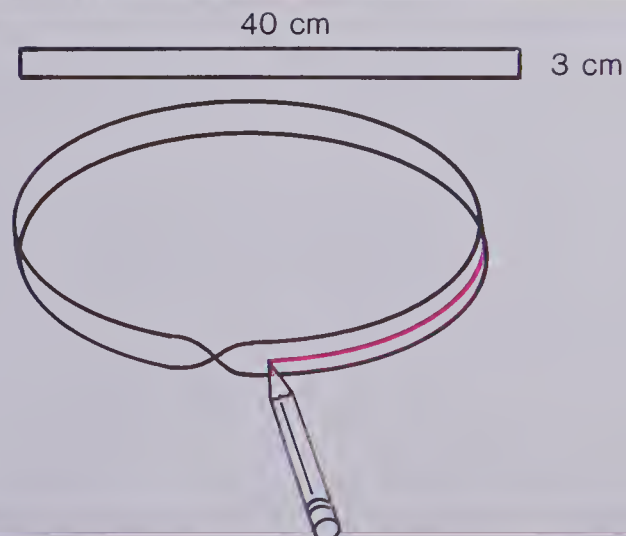
Is the inside ever the outside?

Make a strip of paper as shown.

Twist the strip once and glue.

- (a) Mark the inside of the strip as shown. Keep marking until you get back where you started. Is there an inside and an outside?

- (b) Use scissors to cut down the middle of the strip. What do you notice?





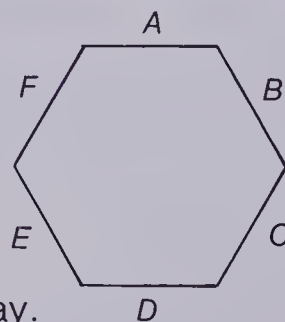
# Chapter Test

Perform the indicated operations.

- |                                |                           |                          |
|--------------------------------|---------------------------|--------------------------|
| 1. $\$12.95 + \$103.58$        | 2. $\$10.57 - \$8.72$     | 3. $\$20.00 - \$16.83$   |
| 4. $\$3.91 + \$0.59 + \$10.05$ | 5. $\$42.50 \times 0.2$   | 6. $\$19.00 \times 0.32$ |
| 7. $\$5.75 \times 0.08$        | 8. $\$325.75 \times 0.06$ | 9. 20% of \$83.50        |
|                                |                           | 10. 4% of \$200.50       |

Solve.

11. (a)  $n \times 3 = 36$  (b)  $n \div 6 = 72$
12. Tony had \$27.83 in his savings account.  
On April 10 he deposited \$8.50, and on April 24 he withdrew \$2.75.  
What was his balance on April 24?
13. Glendale School has 280 students.  
If each student uses 18 pencils per year, how many boxes containing 100 pencils should be ordered?
14. Katrina received a \$200 bond for her birthday.  
How much interest did she receive per year if the bond paid interest at a rate of 9%?
15. Jeremy ran 2 km in 8 min.  
What was his speed in kilometres per hour?
16. The hexagon as shown is rolled.  
About how many times out of 30 would A be up?
17. A large city requires 600 L of water per person per day.  
(Much of this water is used for manufacturing.)  
How many litres are required per person for a year?  
(Write an equation to solve.)
18. Calculate the sales tax and total cost paid for the following items if the sales-tax rate is 8%.  
(a) a desk lamp costing \$20.00 (b) a desk costing \$162.00 (c) a chair costing \$47.50



# Cumulative Review

Perform the indicated operations.

$$\begin{array}{r} 1. \quad 16.9 \\ \times 10 \\ \hline \end{array}$$

$$2. \quad \$18.73 + \$0.91 + \$103.25 + \$3.99$$

$$3. \quad \$208.17 - \$59.69$$

$$4. \quad 8^2$$

$$5. \quad 4^2 \div 2^4$$

$$6. \quad 8 \times 7 \times 6 \times 5$$

$$\begin{array}{r} 7. \quad \frac{7}{8} \\ - \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 3\frac{1}{10} \\ - 2\frac{3}{5} \\ \hline \end{array}$$

$$9. \quad 24 \times \frac{3}{8}$$

$$10. \quad 30 \div \frac{3}{8}$$

Find the missing terms.

$$11. \quad \frac{7}{10} = \frac{\blacksquare}{50}$$

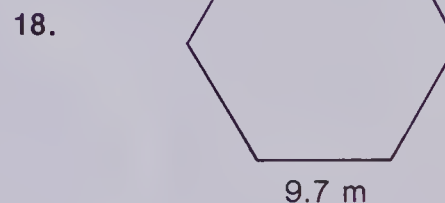
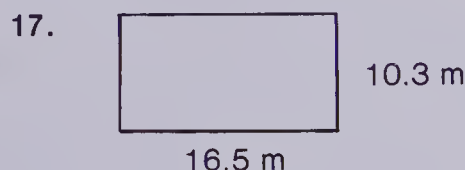
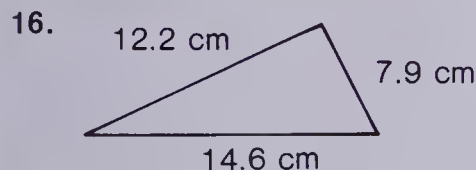
$$12. \quad \frac{12}{15} = \frac{\blacksquare}{5}$$

$$13. \quad \frac{100}{60} = \frac{\blacksquare}{12}$$

$$14. \quad \frac{100}{60} = \frac{15}{\blacksquare}$$

15. What is the angle sum of the 3 angles in any triangle?

Calculate the perimeter of these shapes.



Solve.

$$19. \quad n + 3.5 = 10$$

$$20. \quad n \times 8 = 56$$

$$21. \quad n - 12.7 = 21.8$$

22. Glendale School has 280 students.

35% of these students stay at the school for lunch.

How many students eat lunch at school?

23. Toothpaste sells for \$1.98 for 100 mL and \$2.98 for 150 mL. Which is the better buy?

24. Calculate the monthly payments on a new car that costs \$9000 if the payments are 3% of the selling price per month.

25. Calculate the sales tax on a new refrigerator that costs \$870.00 if the sales-tax rate is 6%.

# Chapter 10

## Integers and Graphs

Related Sentences

Ordered Pairs

Addition and Subtraction of Integers

Picto, Bar, Line, and Circle Graphs





# Graphing Solutions

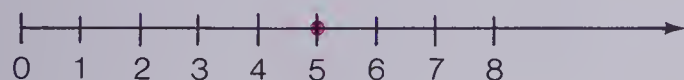
Joanne solved this equation.

She graphed her solution on a number line.

(a)  $2 + N = 7$

$N = 5$

(b) She drew a number line.



She graphed the solution with a •.

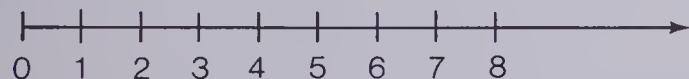


## Exercises

Solve. Then graph the solution on a number line.

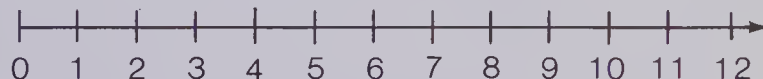
1.  $2 + N = 6$

$N = \blacksquare$



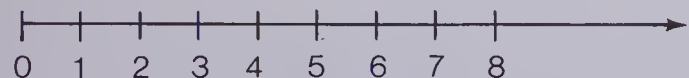
2.  $N - 3 = 8$

$N = \blacksquare$



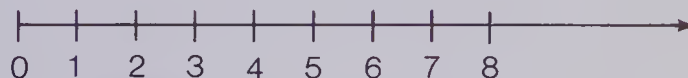
3.  $N + 4 = 6$

$N = \blacksquare$



4.  $M - 4 = 3$

$M = \blacksquare$



5.  $M + 2 = 5$

6.  $A + 2 = 9$

7.  $B + 3 = 10$

8.  $S - 3 = 7$

9.  $T - 4 = 2$

10.  $W - 5 = 4$

11.  $9 + N = 16$

12.  $12 + N = 18$

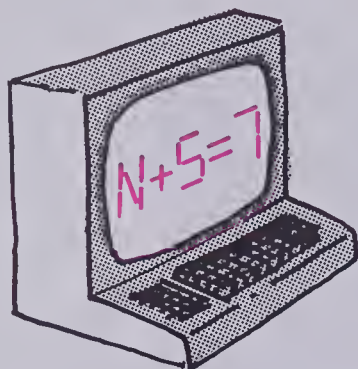
13.  $N + 0 = 4$

14.  $N - 4 = 3$

15.  $S - 6 = 0$

16.  $N + 7 = 13$

# Related Sentences



Shaun was using a micro-computer.  
She saw this equation on the screen.  
She thought about related sentences.

The computer solved the equation  
by using a *related subtraction sentence*.

$$\begin{aligned} N + 5 &= 7 \\ N &= 7 - 5 \\ N &= 2 \end{aligned}$$

## Exercises

Solve each pair of equations.

What do you notice about the solutions?

1. (a)  $N + 2 = 6$   
 $N = \blacksquare$

(b)  $N = 6 - 2$   
 $N = \blacksquare$

2. (a)  $N + 3 = 8$   
 $N = \blacksquare$

(b)  $N = 8 - 3$   
 $N = \blacksquare$

3. (a)  $N + 1 = 13$   
 $N = \blacksquare$

(b)  $N = 13 - 1$   
 $N = \blacksquare$

4. (a)  $N + 4 = 7$

(b)  $N = 7 - 4$

5. (a)  $N + 5 = 12$

(b)  $N = 12 - 5$

6. (a)  $N + 8 = 18$

(b)  $N = 18 - 8$

Write a related subtraction sentence for each. Then solve.

7.  $N + 2 = 6$   
 $N = 6 - \blacksquare$   
 $N = \blacksquare$

8.  $N + 6 = 10$

9.  $N + 10 = 15$

10.  $N + 12 = 25$

11.  $N + 15 = 35$

12.  $N + 17 = 42$

13.  $N + 1.5 = 2.5$

14.  $N + 2.1 = 3.4$

15.  $N + 4.2 = 6.7$

16.  $N + 9.2 = 11.6$

17.  $N + 5.6 = 13.0$

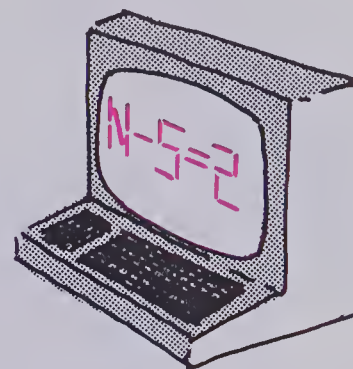
18.  $N + 4.9 = 11.3$

# More Related Sentences

Shaun saw this equation on the screen.

The computer solved the equation by printing a *related addition sentence*.

$$\begin{array}{l} N - 5 = 2 \\ N = 2 + 5 \\ N = 7 \end{array}$$



## Exercises

Solve each pair of equations.

What do you notice about the solutions?

1. (a)  $N - 2 = 6$   
 $N = \blacksquare$

(b)  $N = 6 + 2$   
 $N = \blacksquare$

2. (a)  $N - 1 = 6$   
 $N = \blacksquare$

(b)  $N = 6 + 1$   
 $N = \blacksquare$

3. (a)  $N - 3 = 8$   
 $N = \blacksquare$

(b)  $N = 8 + 3$   
 $N = \blacksquare$

4. (a)  $N - 5 = 4$

(b)  $N = 4 + 5$

5. (a)  $N - 6 = 4$

(b)  $N = 4 + 6$

6. (a)  $N - 12 = 20$

(b)  $N = 20 + 12$

Write a related addition sentence for each, and then solve.

7.  $N - 7 = 10$   
 $N = 10 + \blacksquare$   
 $N = \blacksquare$

8.  $N - 6 = 3$

9.  $N - 3 = 10$

10.  $N - 9 = 1$

11.  $N - 5 = 4$

12.  $N - 16 = 38$

13.  $N - 0.5 = 2.5$

14.  $N - 3.6 = 1.8$

15.  $N - 2.7 = 1.2$

16.  $N - 4.3 = 4.2$

17.  $N - 5.6 = 7.6$

18.  $N - 10.8 = 20.3$



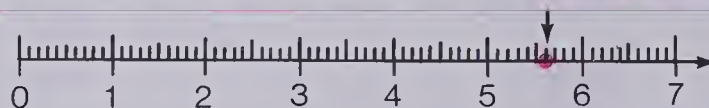
# Jogging

Mark was training for the track team.  
He ran at noon.  
After school he jogged 6.2 km.  
His total distance for the day was 11.8 km.  
How far did he go at noon?  
Show your answer on a number line.



Related sentences  $\rightarrow$   $N + 6.2 = 11.8$   
 $\rightarrow$   $N = 11.8 - 6.2$   
 $N = 5.6$   
 $5.6 + 6.2 = 11.8$   $\leftarrow$  It works!

He ran 5.6 km at noon.



## Exercises

Solve. Graph each solution on a number line marked in tenths.

1.  $N = 3.2 - 1.3$

$N = \blacksquare$



2.  $N = 1.6 - 1.5$

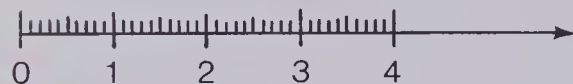
$N = \blacksquare$



3.  $N + 1.4 = 2.3$

$N = 2.3 - 1.4$

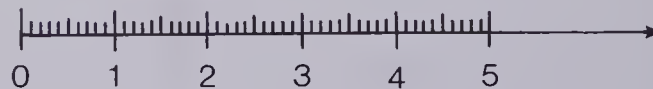
$N = \blacksquare$



4.  $M + 7.3 = 12.2$

$M = 12.2 - 7.3$

$M = \blacksquare$



5.  $M + 0.8 = 3.4$

6.  $K + 16.4 = 20.2$

7.  $K + 1.4 = 1.8$

8.  $K + 4.8 = 6.9$

9.  $K + 9.8 = 13.2$

10.  $N + 3.6 = 6.3$

11. Marianne ran on Saturday. On Sunday she went 6.4 km.

Her total weekend distance was 10.8 km. How far did she run on Saturday?

# Graphing Decimals

Chris used 3.4 cm of wire on his model.  
He had 2.3 cm left.  
How much did he have at the beginning?  
Show your answer on a number line.

N is the number of centimetres he had at the beginning.

Related sentences  $\rightarrow$   $N - 3.4 = 2.3$   
 $N = 2.3 + 3.4$   
 $N = 5.7$

Check:  $5.7 - 3.4 = 2.3$   $\leftarrow$  It works!  
He had 5.7 cm at the beginning.



Use a number line marked in tenths.

Solution



## Exercises

Solve. Graph each solution on a number line marked in tenths.

1.  $N = 2.3 + 1.6$   
 $N = \blacksquare$



2.  $N = 3.6 + 2.7$   
 $N = \blacksquare$



3.  $N - 2.1 = 1.3$   
 $N = 1.3 + \blacksquare$   
 $N = \blacksquare$



4.  $N - 4.2 = 1.6$   
 $N = 1.6 + \blacksquare$   
 $N = \blacksquare$



5.  $N - 3.3 = 2.2$

6.  $N - 4.4 = 1.1$

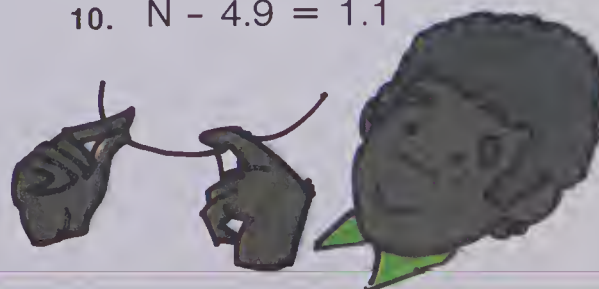
7.  $N - 4.5 = 0$

8.  $N - 5.5 = 1.6$

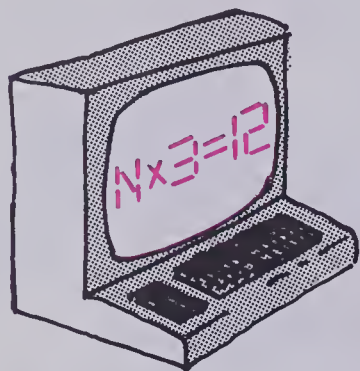
9.  $N - 0.3 = 5.6$

10.  $N - 4.9 = 1.1$

11. Mike had some wire.  
He used 6.2 cm.  
He now has 11.2 cm left.  
How much wire did he have when he started?



# Related Sentences for Multiplication



The computer gave Kevin this problem.  
He solved it by using related sentences.

$$N \times 3 = 12$$

$$N = 12 \div 3$$

$$N = 4$$

Check:  $4 \times 3 = 12$  ← It works!

## Exercises

Solve each pair of equations.

What do you notice about the solutions?

1. (a)  $N \times 2 = 6$   
 $N = \blacksquare$

(b)  $N = 6 \div 2$   
 $N = \blacksquare$

2. (a)  $N \times 3 = 18$   
 $N = \blacksquare$

(b)  $N = 18 \div 3$   
 $N = \blacksquare$

3. (a)  $N \times 4 = 20$   
 $N = \blacksquare$

(b)  $N = 20 \div 4$   
 $N = \blacksquare$

4. (a)  $N \times 5 = 40$   
 $N = \blacksquare$

(b)  $N = 40 \div 5$   
 $N = \blacksquare$

5. (a)  $N \times 8 = 72$   
 $N = \blacksquare$

(b)  $N = 72 \div 8$   
 $N = \blacksquare$

6. (a)  $N \times 9 = 63$   
 $N = \blacksquare$

(b)  $N = 63 \div 9$   
 $N = \blacksquare$

Write a related division sentence for each, and then solve.

7.  $N \times 4 = 36$   
 $N = 36 \div \blacksquare$   
 $N = \blacksquare$

8.  $N \times 3 = 30$

9.  $N \times 8 = 56$

10.  $N \times 12 = 72$

11.  $N \times 15 = 45$

12.  $N \times 20 = 400$

13.  $N \times 2 = 8.6$

14.  $N \times 8 = 9.6$

15.  $N \times 10 = 6.4$

16.  $N \times 3.2 = 6.4$

17.  $N \times 3.1 = 7.75$

18.  $N \times 4.3 = 10.32$



# Related Sentences for Division

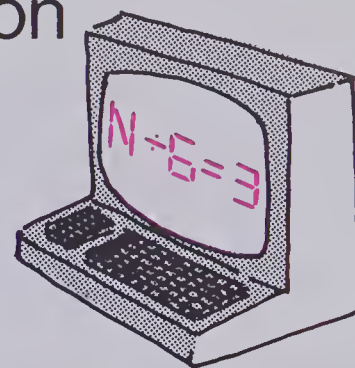
To find N in this equation,

Carol used a related sentence for division:

$$N \div 6 = 3$$

$$N = 3 \times 6$$

$$N = 18$$



Check:  $18 \div 6 = 3$  ← It works!

## Exercises

Solve each pair of equations.

What do you notice about the solutions?

1. (a)  $N \div 4 = 5$

$$N = \blacksquare$$

(b)  $N = 5 \times 4$

$$N = \blacksquare$$

2. (a)  $N \div 3 = 7$

$$N = \blacksquare$$

(b)  $N = 7 \times 3$

$$N = \blacksquare$$

3. (a)  $N \div 4 = 7$

$$N = \blacksquare$$

(b)  $N = 7 \times 4$

$$N = \blacksquare$$

4. (a)  $N \div 6 = 9$

$$N = \blacksquare$$

(b)  $N = 9 \times 6$

$$N = \blacksquare$$

5. (a)  $N \div 8 = 6$

$$N = \blacksquare$$

(b)  $N = 6 \times 8$

$$N = \blacksquare$$

6. (a)  $N \div 9 = 9$

$$N = \blacksquare$$

(b)  $N = 9 \times 9$

$$N = \blacksquare$$

Write a related multiplication sentence, and then solve.

7.  $N \div 5 = 9$

$$N = 9 \times \blacksquare$$

$$N = \blacksquare$$

8.  $N \div 10 = 10$

9.  $N \div 8 = 56$

10.  $N \div 12 = 6$

11.  $N \div 8 = 11$

12.  $N \div 9 = 12$

13.  $N \div 4 = 8.4$

14.  $N \div 2.3 = 6$

15.  $N \div 4.1 = 3.2$

16.  $N \div 6.2 = 3.5$

17.  $N \div 8 = 13.2$

18.  $N \div 0.8 = 0.9$

# The Young Naturalists

Penny has a bag of bird seed.  
 She calculates she needs 4 kg more.  
 In all she needs 16 kg.  
 How much does she have now?

Use N to represent the number of kilograms she has now.

She has now	+	She needs more	=	She needs altogether
N	+	4	=	16

Equation:  $N + 4 = 16$   
 Solve:  $N = 12$   
 Check:  $12 + 4 = 16$  ← It works!  
 Statement: Penny has 12 kg of bird seed now.



## Exercises

Write an equation to solve each problem.

- Jeff planted birch trees last week.  
 He planted 23 more this week.  
 In total he has now planted 56.  
 How many trees did he plant last week?  
 Use N to represent the number of trees planted last week.

Planted last week + planted this week = planted altogether

■ + ■ = ■

Equation:  $N + \blacksquare = \blacksquare$

Solve:  $N = \blacksquare$

Check:  $\blacksquare + \blacksquare = \blacksquare$

Statement: Jeff planted ■ trees last week.

- Nadine helped clean up the park.  
 She worked 6 h each day.  
 She worked 30 h in all.  
 How many days did she work?

- Connie was painting picnic tables.  
 There were 42 tables in total.  
 She painted 6 each day.  
 How many days did she paint?

- Craig went fishing for pickerel.  
 He gave away 4.3 kg of fish to friends.  
 He kept one fish with a mass of 2.8 kg for himself.  
 What mass of fish did he catch altogether?

- Marco counted 42 more Canada Geese than Alphonse.  
 Alphonse counted 156 geese.  
 How many did Marco count?

# Ordered Pairs

Martin's class voted on a class sweater.



1

4 votes



2

7 votes



3

15 votes



4

1 vote



5

0 votes

We can show the information by using ordered pairs.

(1,4)

(2,7)

(3,15)

(4,1)

(5,0)

## Exercises

1. In the ordered pair (2,7), what does the 2 mean? What does the 7 mean?
2. What does the ordered pair (3,15) mean?
3. Does (1,4) mean the same as (4,1)? Explain.

The class voted for class president.



1



2



3



4

Candidate	Number of Votes
1	4
2	5
3	2
4	16

4. Write the information showing the results of the voting by using ordered pairs.
5. Harry wrote the information this way:  
 (4,1)      (5,2)      (2,3)      (16,4)

Explain what Harry meant by his ordered pairs.



# Graphing Ordered Pairs

Mathematicians have agreed to always name the numbers in a definite order.

They name the vertical line first:  $(6, \quad)$

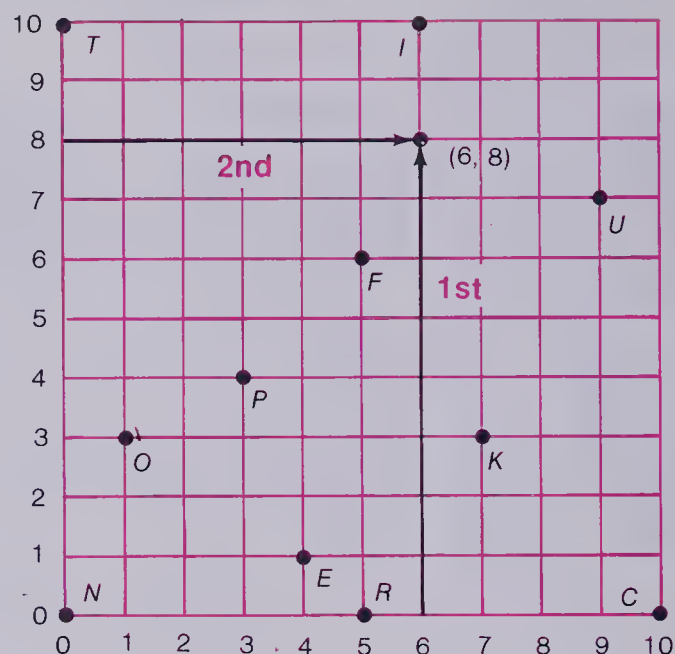
They name the horizontal line second:  $(\quad, 8)$

To indicate the numbers are in a definite order, brackets are placed around the numbers:

$(6, 8)$

This is called an **ordered pair**.

The name for point K is  $(7, 3)$ .



## Exercises

1. Refer to the display.

Copy and place the letters in the blanks to answer the question.

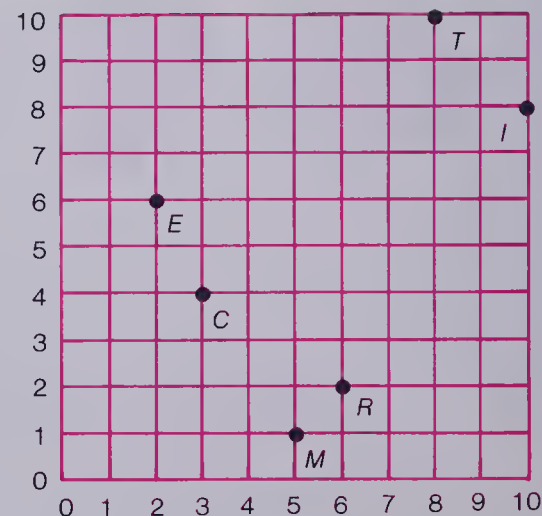
What do cats strive for?

$(3, 4)$   $(9, 7)$   $(5, 0)$   $(5, 0)$   $(5, 6)$   $(4, 1)$   $(10, 0)$   $(0, 10)$   $(6, 10)$   $(1, 3)$   $(0, 0)$

2. Copy and complete the chart.

1st Number	5	2	8	6	10	3
2nd Number	1			2		
Ordered pair	$(5, 1)$	$(2, 6)$			$(10, 8)$	
Letter			T			C

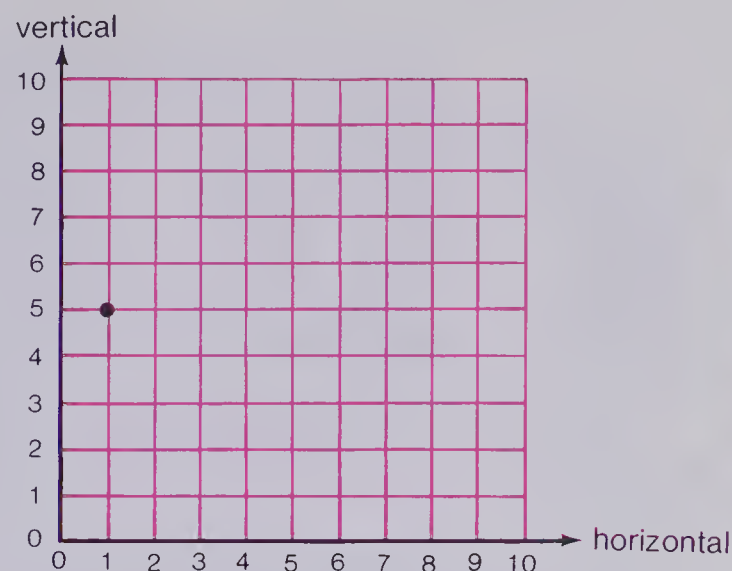
Do the letters form a word?



3. Use graph paper.  
Draw and label two  
lines: one vertical  
one horizontal

Graph these ordered pairs.

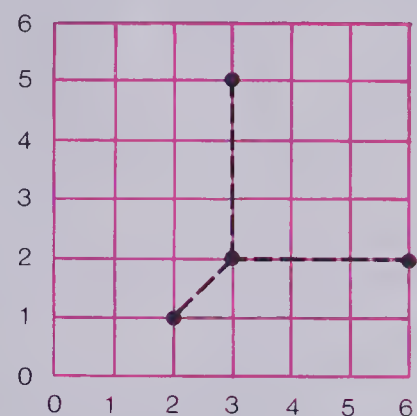
$(1,5)$ ,  $(3,1)$ ,  $(8,9)$ ,  $(4,0)$ ,  
 $(10,1)$ ,  $(0,5)$ ,  $(7,6)$ ,  $(9,8)$



4. Pictures can be drawn by graphing  
ordered pairs and joining the points.  
Mark these points on a grid.

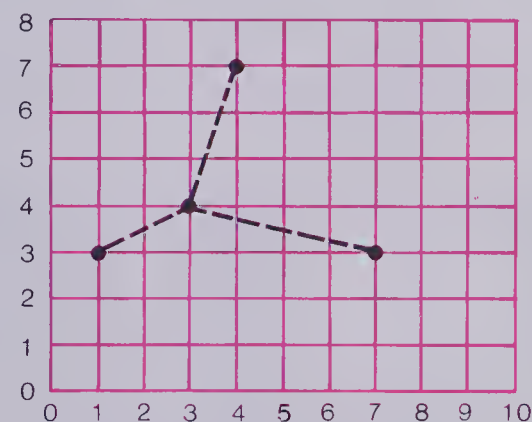
$(2,1)$ ,  $(2,4)$ ,  $(3,5)$ ,  $(3,2)$ ,  
 $(6,5)$ ,  $(6,2)$ ,  $(5,1)$ ,  $(5,4)$

Join the points to make a cube.



5. Draw a pyramid by using these points.

$(1,3)$ ,  $(4,7)$ ,  $(7,3)$ ,  $(5,1)$ ,  $(3,4)$

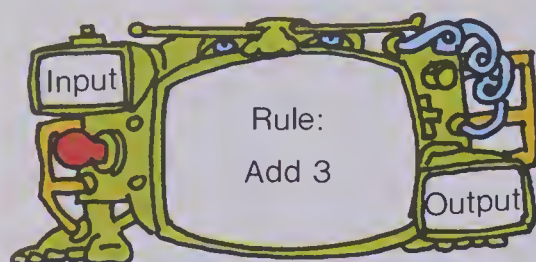


6. Draw a triangular prism by using these points.

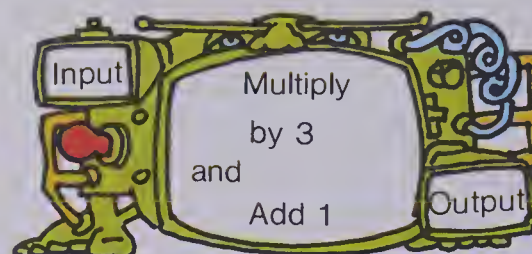
$(1,2)$ ,  $(2,6)$ ,  $(5,6)$ ,  $(6,1)$ ,  $(4,2)$ ,  $(3,1)$



# Generating Ordered Pairs



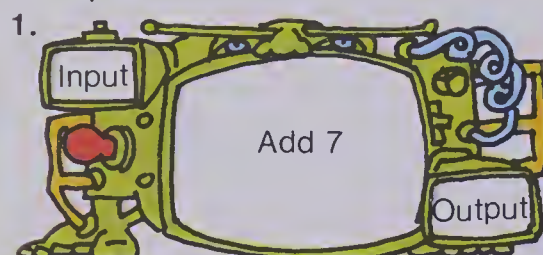
Input	1	2	3	5
Output	4	5	6	8



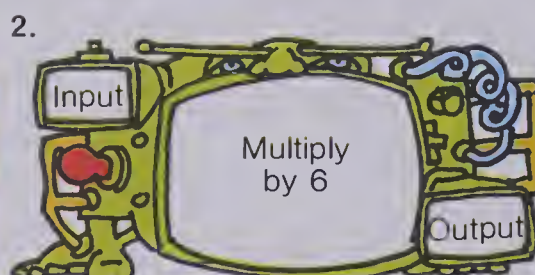
Input	1	2	3	10
Output	4	7	10	31

## Exercises

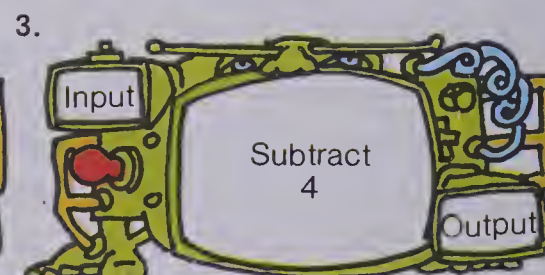
Complete each table.



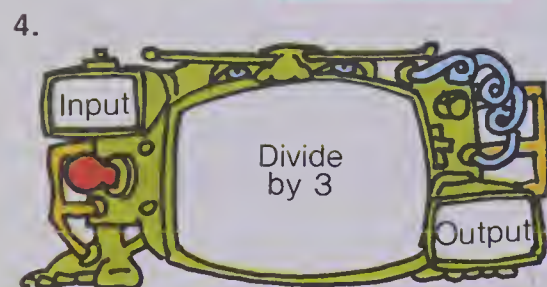
Input	0	1	2	5	10
Output	7				



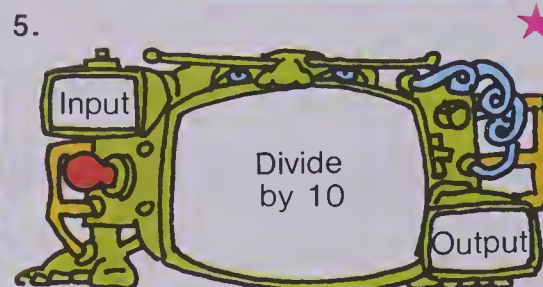
Input	0	3	9	10	12
Output					



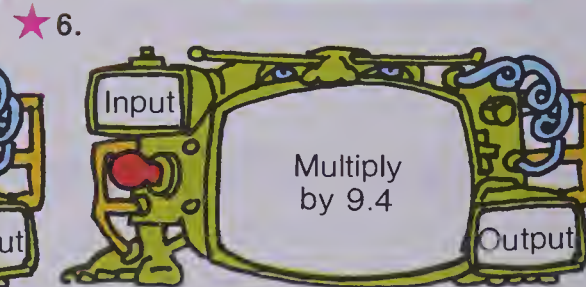
Input	5	10	15	20	25
Output					



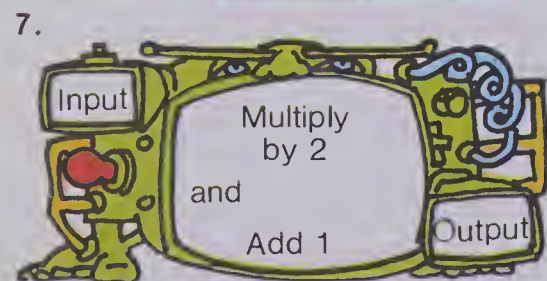
Input	3	6	9	12	30
Output					



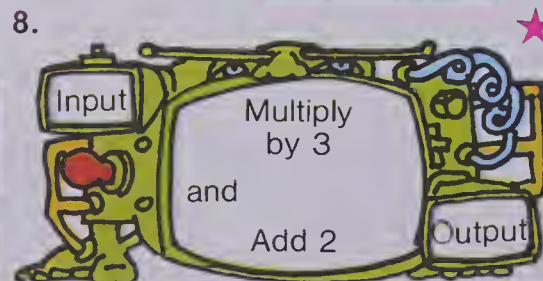
Input	10	20	30	1
Output				



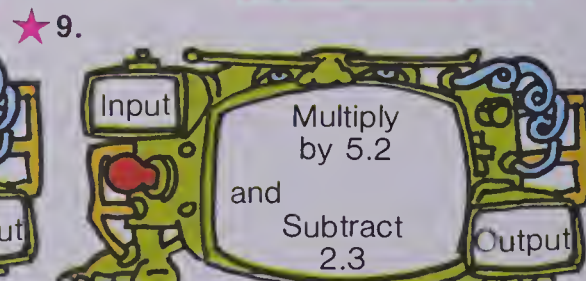
Input	0	1	2	5	10
Output					



Input	1	2	3	5	10
Output					



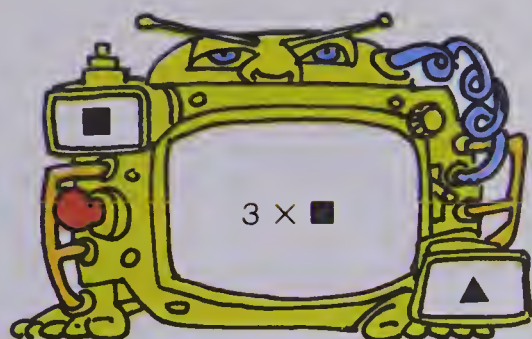
Input	1	3	5	10	15
Output					



Input	1	2	3	5	6
Output					

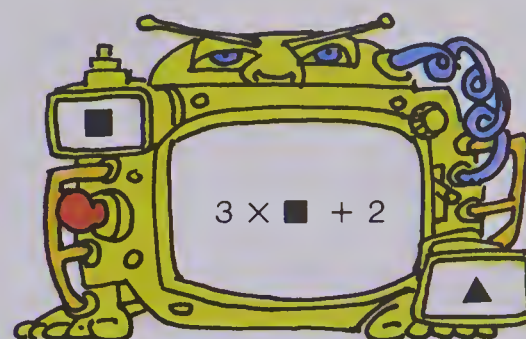


10.



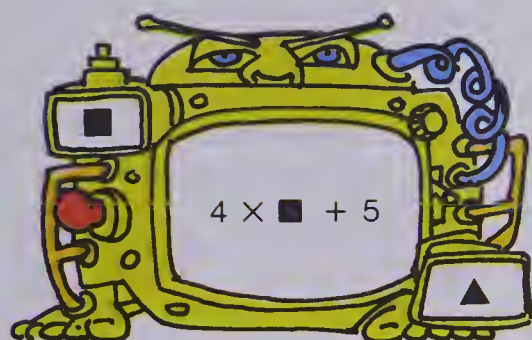
■	1	2	3	4	10
▲	3				

11.



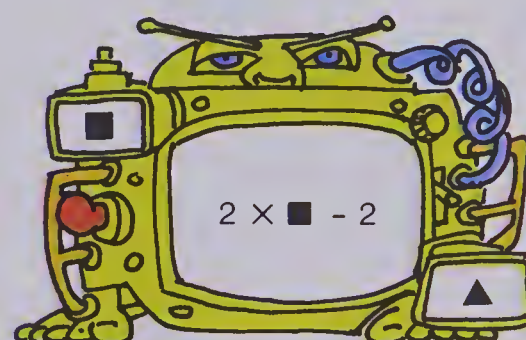
■	1	2	3	4	10
▲	5				

12.



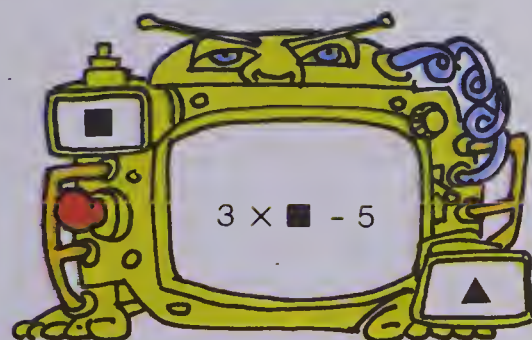
■	0	1	2	5	10
▲		9			

13.



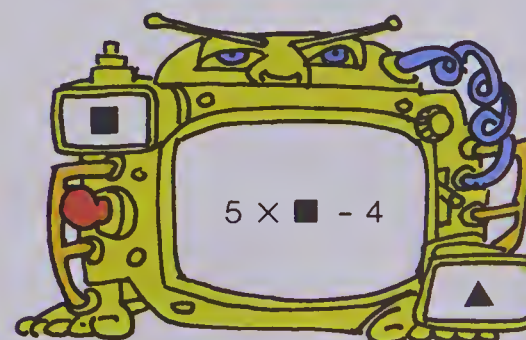
■	2	3	5	6	10
▲					

14.



■	2	4	6	8	10
▲					

15.



■	1	3	5	7	9
▲					

16. Rule: Multiply by 2 and add 2.

Input	1	2	3	5	8
Output					

17. Rule:  $3 \times \blacksquare + 5 = \blacktriangle$ 

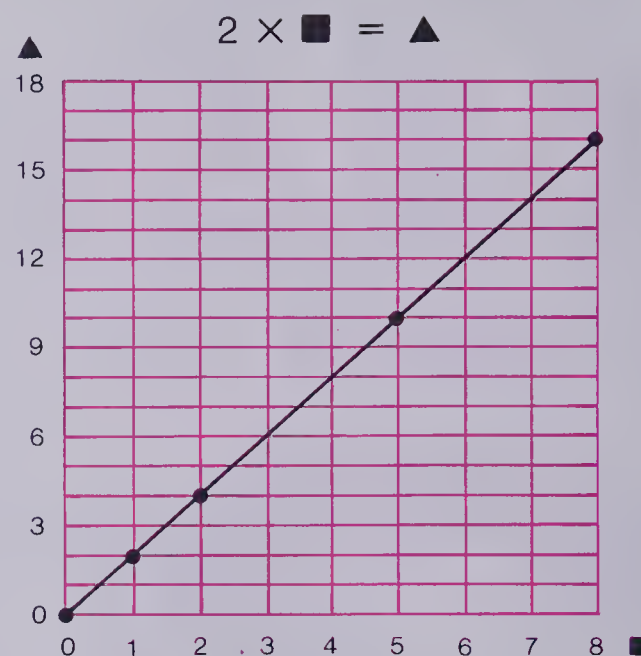
■	0	2	4	6	8
▲					

# Graphing Points

Complete the table.  
Graph the ordered pairs.



■	0	1	2	5	8
▲	0	2	4	10	16
Ordered pairs	(0,0)	(1,2)	(2,4)	(5,10)	(8,16)

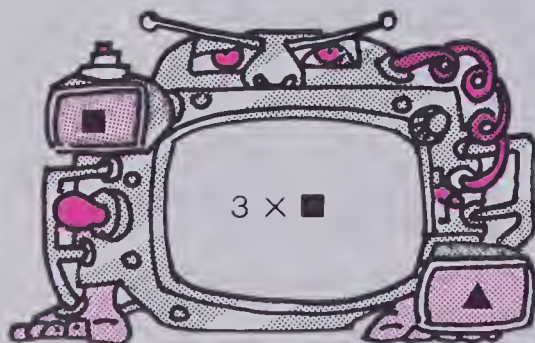


Draw a line through the points.

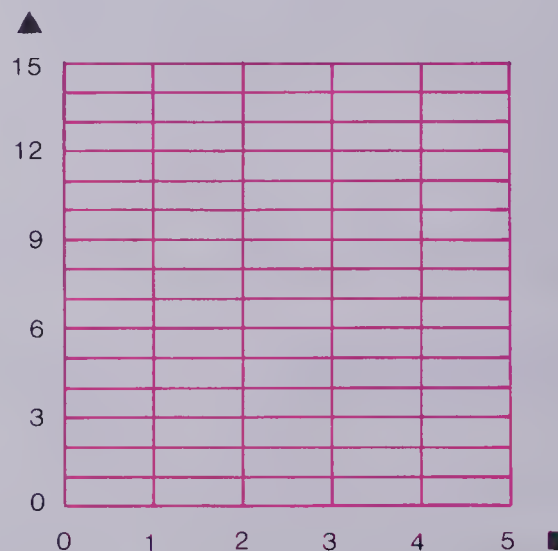
## Exercises

Complete the table.  
Graph the ordered pairs.  
Join the points.

1.

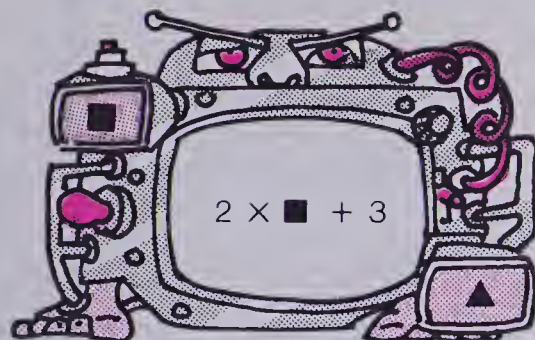


■	1	2	3	4	5
▲					
Ordered pairs					

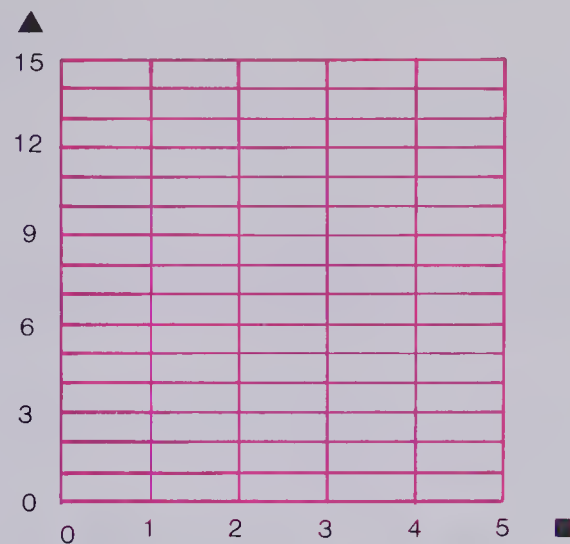




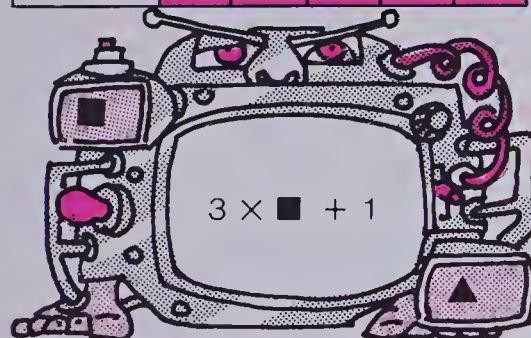
2.



■	1	2	3	4	5
▲					
Ordered pairs					

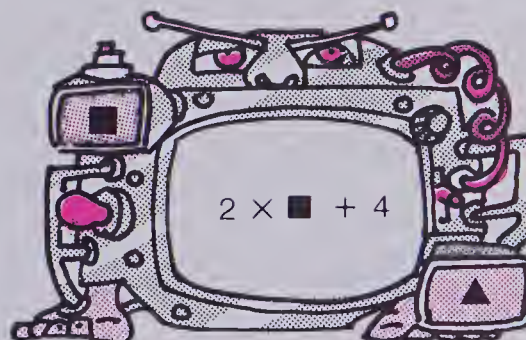


3.



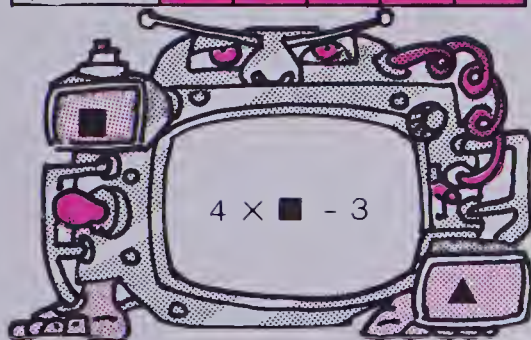
■	1	2	3	4	5
▲					
Ordered pairs					

4.



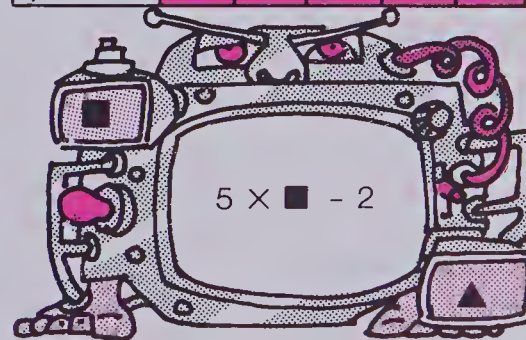
■	1	2	3	4	5
▲					
Ordered pairs					

5.



■	1	2	3	4	5
▲					
Ordered pairs					

6.

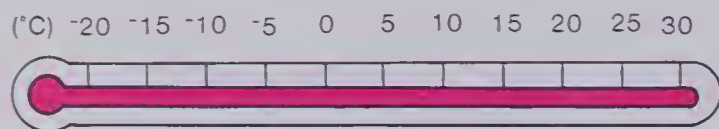


■	1	2	3	4	5
▲					
Ordered pairs					

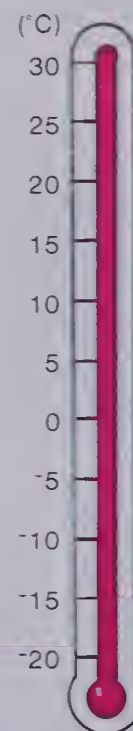


# Temperatures

You have used thermometers  
like this:



or like this:



Temperatures greater than 0 are called  
**positive temperatures.**

Temperatures less than 0 are called  
**minus temperatures.**

20°C is warmer than -5°C.

-5°C is colder than 10°C.

## Exercises

1. Which is warmer?

(a) 15°C or 10°C

(b) 10°C or -5°C

(c) 10°C or -10°C

2. Which is cooler?

(a) 20°C or 5°C

(b) 5°C or -10°C

(c) 15°C or -15°C

3. Use “warmer than” or “cooler than” to make these statements true.

(a) 30°C ● -10°C

(b) 10°C ● -20°C

(c) -5°C ● -15°C

(d) -10°C ● 5°C

(e) 10°C ● 20°C

(f) -15°C ● -10°C

4. How many degrees from:

(a) 10°C to 30°C?

(b) 5°C to 35°C?

(c) -5°C to 0°C?

(d) 0°C to 10°C?

(e) -5°C to 10°C?

(f) -10°C to 15°C?

5. The temperature was 10°C. It went up 5°C. What is it now?

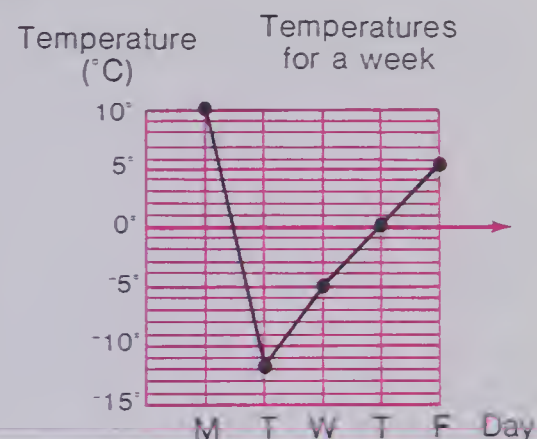
6. The temperature was -10°C. It went up 15°C. What is it now?

7. The temperature was 5°C. It went down 10°C. What is it now?

# Graphing Temperatures

Class 6A recorded the temperatures for a week in January.

Day	Mon.	Tues.	Wed.	Thurs.	Fri.
Temperature ( $^{\circ}\text{C}$ )	$10^{\circ}$	$-12^{\circ}$	$-5^{\circ}$	$0^{\circ}$	$5^{\circ}$



## Exercises

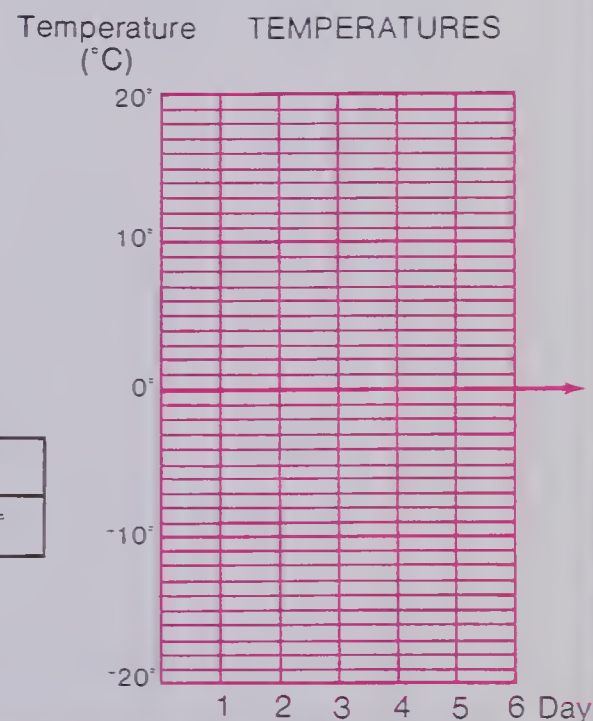
- Which day was the coldest? the warmest?
- How many degrees difference was there in the temperature between:
  - Monday and Tuesday?
  - Tuesday and Wednesday?
  - the warmest and coldest days?

- Draw and label a graph to show these temperatures.

Day	1	2	3	4	5	6
Temperature ( $^{\circ}\text{C}$ )	$18^{\circ}$	$12^{\circ}$	$0^{\circ}$	$-5^{\circ}$	$-8^{\circ}$	$-16^{\circ}$

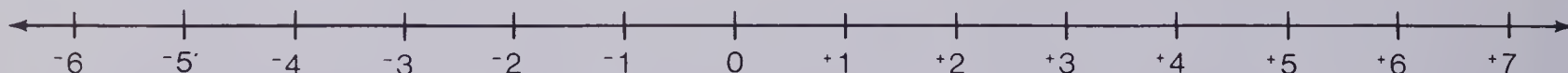
- Draw and label a graph as in Exercise 3. Show this information.

Day	1	2	3	4	5	6	7	8	9	10
Temperature ( $^{\circ}\text{C}$ )	$15^{\circ}$	$8^{\circ}$	$5^{\circ}$	$-5^{\circ}$	$0^{\circ}$	$8^{\circ}$	$-2^{\circ}$	$3^{\circ}$	$-10^{\circ}$	$-18^{\circ}$



# The Integer Number Line

We can show positive and negative numbers on a number line.



Numbers to the left of zero are **negative numbers**.

Zero is neither *positive nor negative*.

Numbers to the right of zero are **positive numbers**.

The *positive* and *negative* numbers along with zero are called **integers**.

## Exercises

Copy and complete.

1. Use *left* or *right* to make true statements.

(a) +5 is  of +4

(b) +4 is  of -5

(c) -5 is  of -10      (d) 0 is  of +8

2. Numbers to the *right* are *greater* than numbers to the left.  
Use  $>$  to mean *greater than*.  
+5  $>$  -6

Numbers to the *left* are *less* than numbers to the right.  
Use  $<$  to mean *less than*.  
-7  $<$  +2

(a) +10  $\bullet$  +3

(b) -5  $\bullet$  +2

(c) -8  $\bullet$  -10

(d) +8  $\bullet$  -12

3. We can show integers on a vertical number line.

Copy and complete.

Use *above* or *below* to make true statements.

(a) -5  0      (b) +5  0      (c) -5  +5

(d) +10  +5      (e) -5  -10      (f) +5  -5

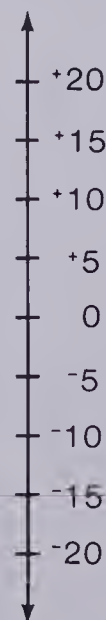
4. Numbers above are *greater* than numbers below.

Numbers below are *less* than numbers above.

Use  $>$  or  $<$  to mean *greater than* or *less than*.

(a) -5  $\bullet$  0      (b) +5  $\bullet$  0      (c) -5  $\bullet$  +5

(d) +10  $\bullet$  +5      (e) -5  $\bullet$  -10      (f) +5  $\bullet$  -5



Numbers above zero are *positive*.

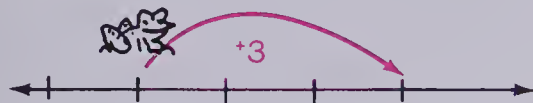
Numbers below zero are *negative*.



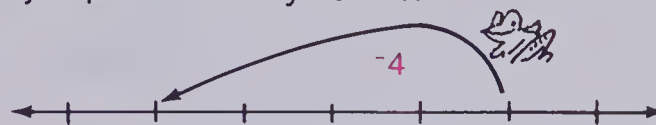
# Addition on the Integer Line

Gurp, the spotted frog, jumped on the integer line.

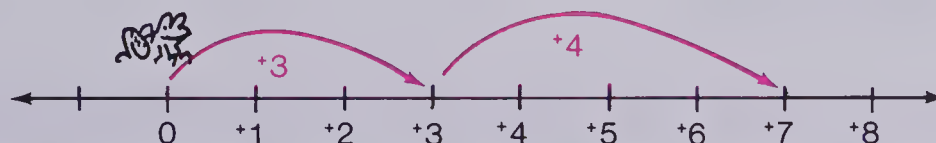
He jumped this way for  $+3$ .



He jumped this way for  $-4$ .

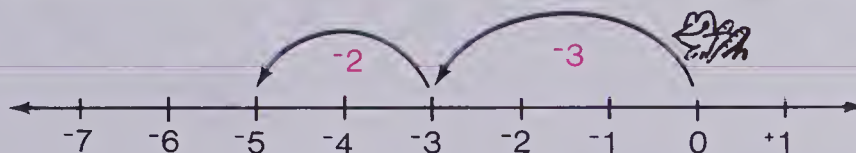


One day he jumped like this. He was 7 units right of where he started.



$$+3 + +4 = +7$$

Another day he jumped like this. He was 5 units left of where he started.



$$-3 + -2 = -5$$

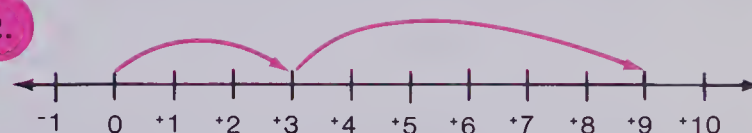
## Exercises

Write an integer number sentence for each.

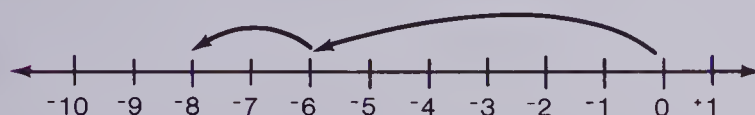
1.



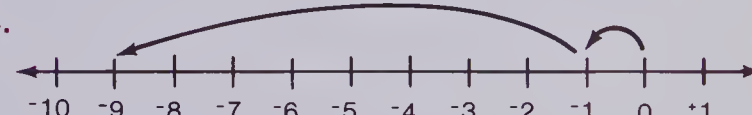
2.



3.



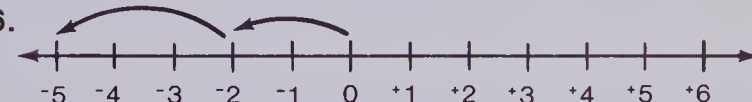
4.



5.



6.



Add. Show each on an integer line.

7.  $+3 + +7$

8.  $+1 + +6$

9.  $+6 + +3$

10.  $0 + +3$

11.  $-2 + -6$

12.  $-3 + -8$

13.  $-5 + -4$

14.  $0 + -5$

15.  $+14 + +29$

16.  $-19 + -34$

17.  $-42 + -57$

18.  $+23 + +68$

19.  $-82 + -69$

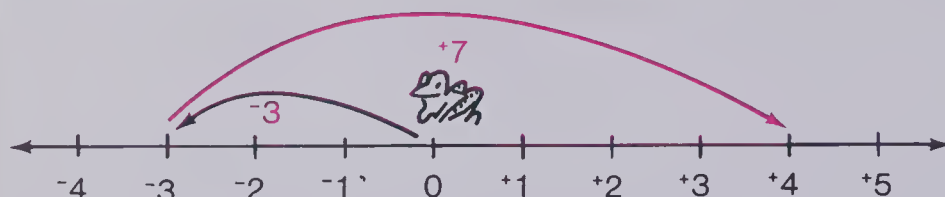
20.  $+84 + +97$

21.  $+106 + +233$

22.  $-431 + -237$

# Adding Positive and Negative Integers

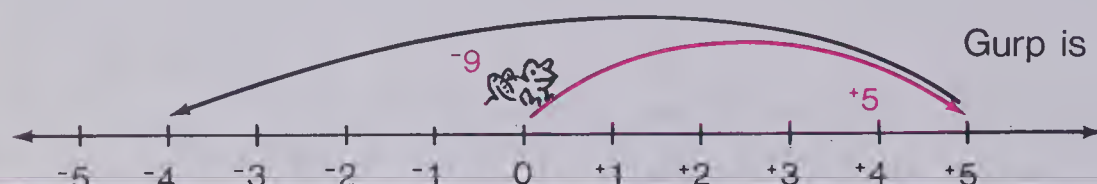
Gurp jumped left first. Then he jumped right.



$$-3 + +7 = +4$$

Gurp is 4 units right of where he started.

This time Gurp jumped right first, then left.

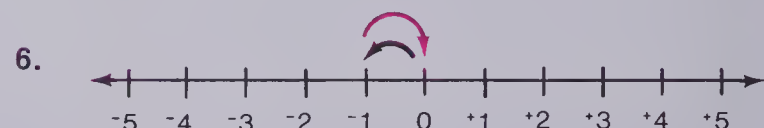
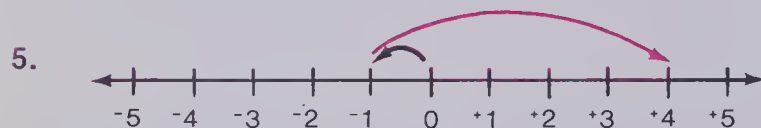
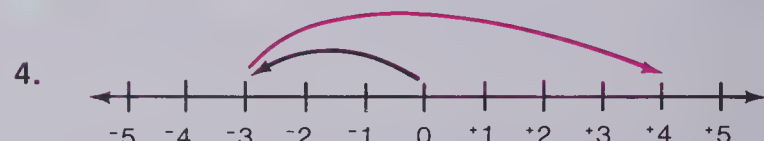
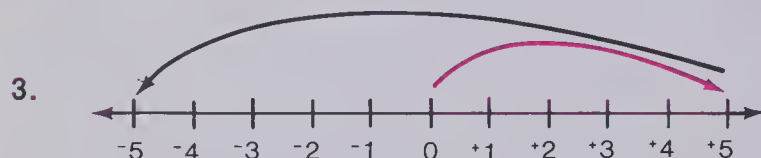
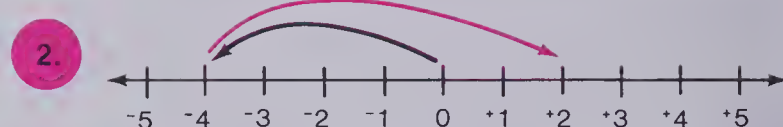
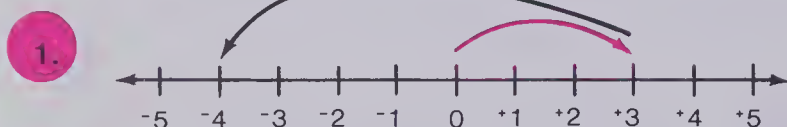


$$+5 + -9 = -4$$

Gurp is 4 units left of where he started.

## Exercises

Write an integer number sentence for each.



Add. Show each on an integer line.

7.  $+3 + -4$

8.  $+5 + -7$

9.  $+6 + -2$

10.  $+10 + -12$

11.  $-5 + +6$

12.  $-6 + +7$

13.  $-3 + +8$

14.  $-12 + +14$

15.  $+9 + -3$

16.  $-11 + +4$

17.  $-16 + +14$

18.  $+22 + -18$

19.  $-47 + +56$

20.  $+63 + -72$

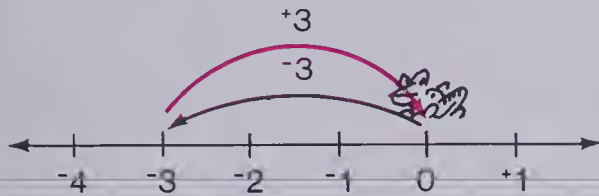
21.  $-63 + -47$

22.  $+96 + +104$

# Opposites



Gurp jumped left three units.  
Then he jumped right three units.  
He was right back where he started.



We say that  $-3$  is *the opposite* of  $+3$  and  $+3$  is *the opposite* of  $-3$ .

## Exercises

Write the opposite of each.

1.  $+3$

2.  $+7$

3.  $-2$

4.  $-6$

5.  $+9$

6.  $-11$

7.  $+29$

8.  $-31$

9.  $-104$

10.  $+105$

11.  $-596$

12.  $+465$

Solve.

13.  $-6 + +6 = n$

14.  $+12 + -12 = n$

15.  $-23 + +23 = n$

16.  $+8 + n = 0$

17.  $-5 + n = 0$

18.  $-18 + n = 0$

19.  $n + -2 = 0$

20.  $n + +3 = 0$

21.  $n + -9 = 0$

22.  $n + -36 = 0$

23.  $n + +57 = 0$

24.  $-43 + n = 0$

Write an integer sentence to solve each problem.

25. In a game, Mark moved ahead 14 spaces. Then he moved back 14 spaces.  
What was his total gain?

26. In the same game, Nancy moved back 19 spaces. How many spaces did she have to  
move forward to get back where she started?



# Subtracting Integers

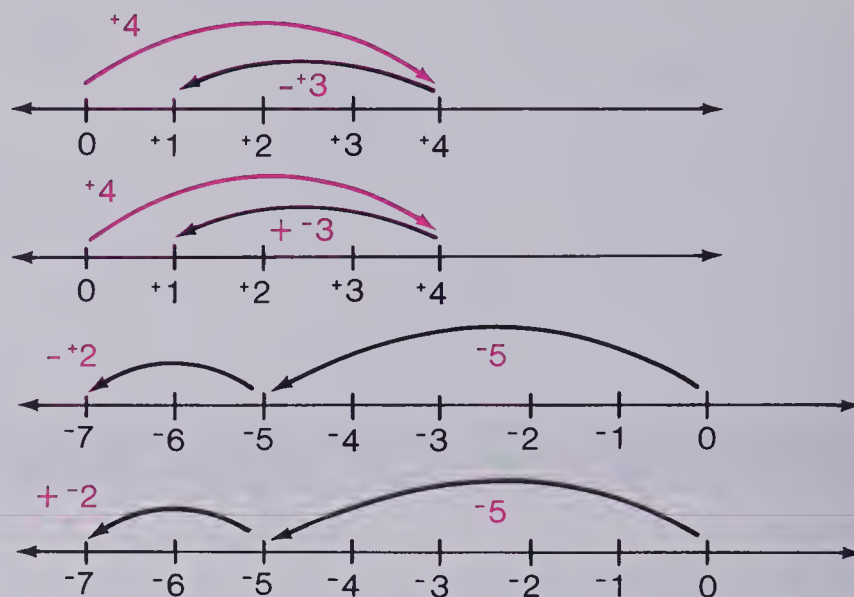
Compare each pair of equations.

$$+4 - +3 = +1$$

$$+4 + -3 = +1$$

$$-5 - +2 = -7$$

$$-5 + -2 = -7$$



Subtracting an integer is like adding its opposite.

## Exercises

Copy and complete each.

1.  $+3 - +2$

$$+3 + -2$$

2.  $+4 - +5$

$$+4 + -5$$

3.  $+2 - +5$

$$+2 + -5$$

4.  $+1 - +4$

$$+1 + -4$$

5.  $+6 - +2$

$$+6 + -2$$

6.  $+5 - +1$

$$+5 + -1$$

7.  $+6 - +7$

$$+6 + -7$$

8.  $+1 - +3$

$$+1 + -3$$

9.  $-3 - +2$

$$-3 + -2$$

10.  $-2 - +4$

$$-2 + -4$$

11.  $-8 - +5$

$$-8 + -5$$

12.  $-10 - +6$

$$-10 + -6$$

13.  $0 - +3$

$$0 + -3$$

14.  $0 - +6$

$$0 + -6$$

15.  $+3 - 0$

$$+3 + 0$$

16.  $-7 - 0$

$$-7 + 0$$

★ Use the rule for subtracting integers to do these.

17.  $+6 - -4$

18.  $+7 - -4$

19.  $+6 - -9$

20.  $+2 - -7$

21.  $-4 - +5$

22.  $-7 - +3$

23.  $-8 - +8$

24.  $-2 - +5$

# Graphing Integers

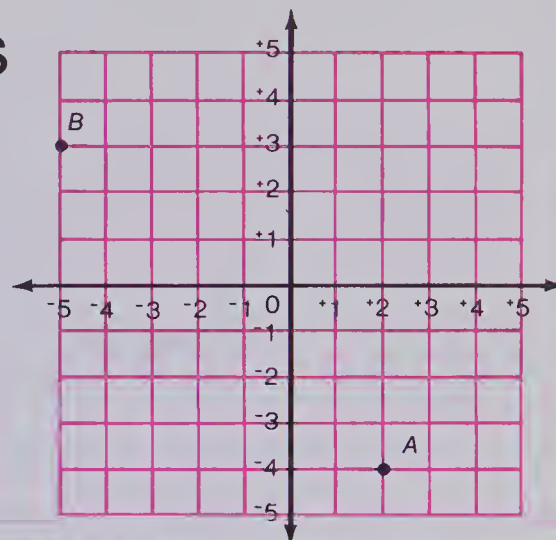
To write the ordered pair for point A:

Think: It is to the *right* of 0 **2** units. Write: **(+2, )**

It is *down* from 0 **4** units. Write: **(+2, -4)**

The ordered pair is **(+2, -4)**.

The ordered pair for point B is **(-5, +3)**.



## Exercises

1. Write the ordered pair for each point.

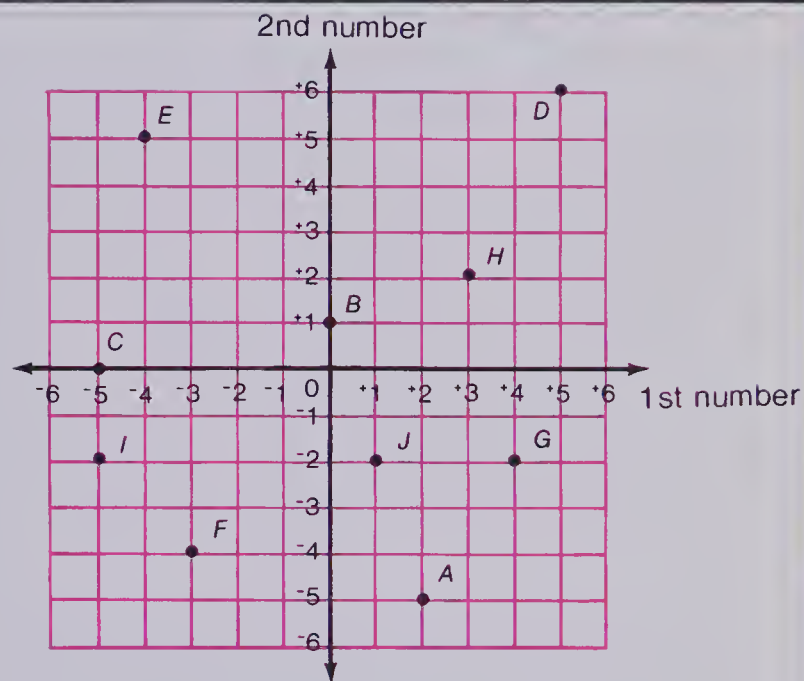
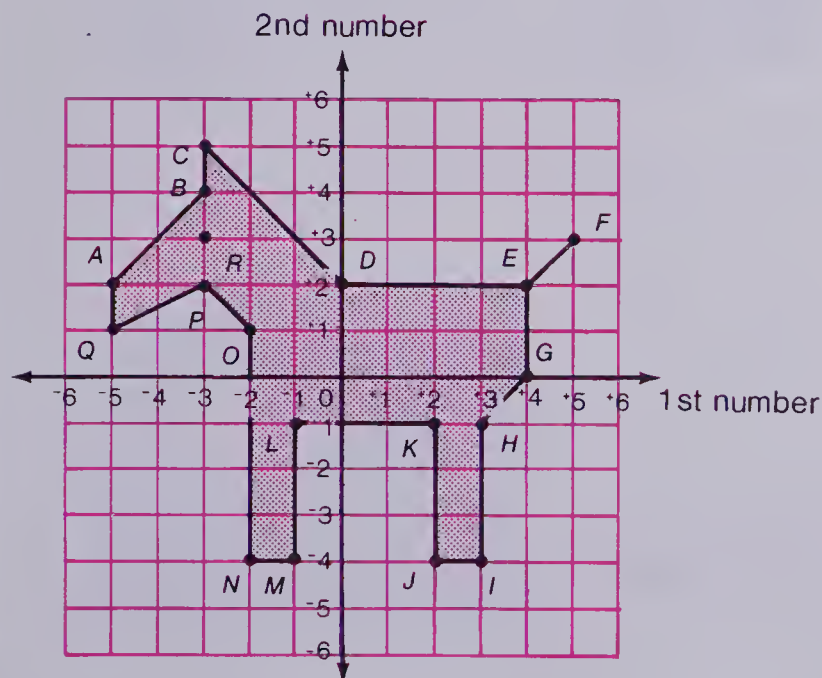
(a) A **(+2, -5)**      (b) B

(c) C      (d) D

(e) E      (f) F

(g) G      (h) H

(i) I      (j) J



2. The graph here shows a dog!

(a) Find the ordered pair for each point A to Q that has to be joined to the next to draw the dog. The point R is the eye.

(b) Plot the ordered pairs you find on your own graph paper to check.

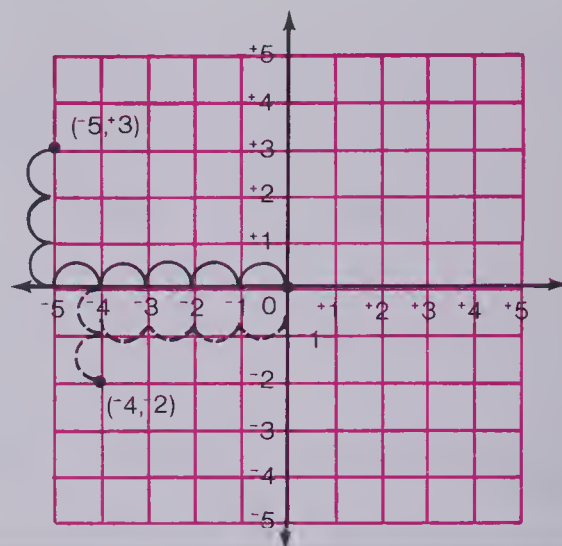
# Graphing More Integers

To locate the point  $(-5, +3)$ :

Start at 0, move *left* **5** units (**-5**, ),  
then move *up* **3** units (**-5, +3**).

To locate the point  $(-4, -2)$ :

Start at 0, move *left* **4** units (**-4**, ),  
then move *down* **2** units (**-4, -2**).



## Exercises

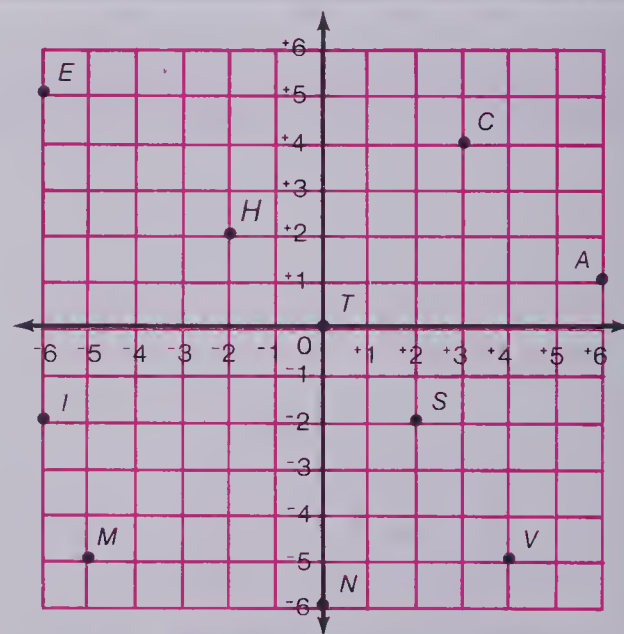
- Decode the message.

$(+6, +1)$   $(+2, -2)$   $(0, 0)$   $(-6, -2)$   $(0, 0)$   
 $(+3, +4)$   $(-2, +2)$   $(-6, -2)$   $(0, -6)$   
 $(0, 0)$   $(-6, -2)$   $(-5, -5)$   $(-6, +5)$   
 $(+2, -2)$   $(+6, +1)$   $(+4, -5)$   $(-6, +5)$   $(+2, -2)$   
 $(0, -6)$   $(-6, -2)$   $(0, -6)$   $(-6, +5)$

- Draw the Red-Tail Road Runner.

Start:  $(-2, -4)$ ,  $(-1, -1)$ ,  $(-5, +4)$ ,  $(-6, +4)$ ,  $(-8, +3)$ ,  
 $(-7, +4)$ ,  $(-6, +7)$ ,  $(-5, +7)$ ,  $(-3, +5)$ ,  $(-2, +2)$ ,  
 $(0, +3)$ ,  $(+2, +3)$ ,  $(+3, +2)$ ,  $(+7, +6)$ ,  $(+6, +6)$ ,  $(+7, +7)$ ,  
 $(+8, +6)$ ,  $(+7, +6)$ ,  $(+4, +1)$ ,  $(+4, 0)$ ,  $(+1, -1)$ ,  $(+1, -6)$ ,  
 $(+1, -7)$ ,  $(0, -7)$ ,  $(+1, -6)$ ,  $(0, -1)$ ,  $(-2, -3)$ ,  
 $(-4, -5)$ ,  $(-4, -6)$ ,  $(-5, -6)$ ,  $(-2, -4)$ . Lift pencil.

Put a large dot with a ring around it for an eye at  $(-6, 6)$ .  
 Colour your Red-Tail Road Runner.





# Mathematicians

Today's mathematicians often use ideas of great mathematicians who lived many years ago.

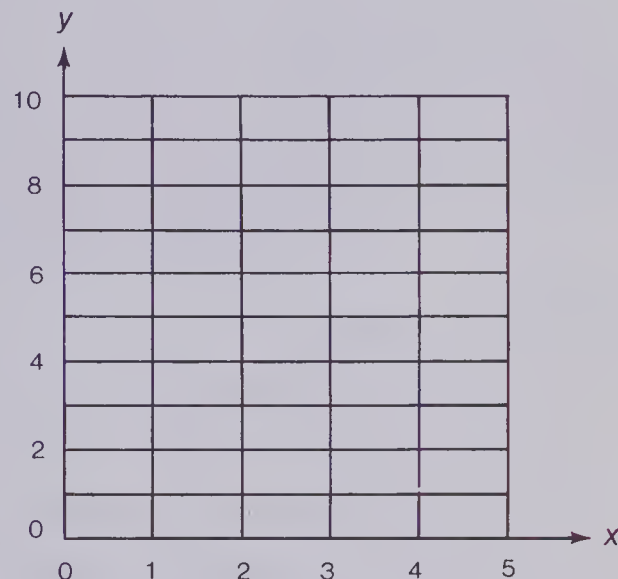
1. René Descartes (1596-1650) developed the system of graphing, using ordered pairs. It is called the **coordinate system**.

Copy the information from the charts and graph it, using the coordinate system.

Join the points.

x	0	0	1	2	2	1	0	1	2
y	1	8	8	7	5	4	4	4	1

x	3	3	4	5	5	4	3
y	1	8	8	7	2	1	1



2. Sir Isaac Newton (1642-1727) discovered that objects fall at a certain rate. To find how far (in metres) an object falls in a certain amount of time (in seconds), we can use this rule:



Use this rule to complete this table:



























T (s)	0	1	2	3	4
D (m)					


★ How far would an apple drop in 0.5 s?

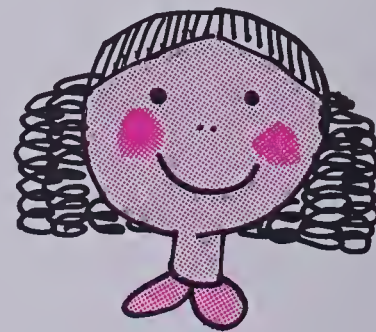
# Pictographs

We often use pictures in graphs to give information.

Number of Students in Schools in Eagleville





Schools	Enrolment
Churchill	        
Parkhill	      
Mt. Royal	     
Sunnyside	   

Key:  = 100 students



## Exercises

Refer to the display.





- How many students does each symbol stand for?
    - 
    - 
    - 
    - 
  - Which school has the most students? the least?
  - How would you show 175 students?
  - What is the title of the pictograph?
  - How many students in each school?
  - How many students in all four schools?

- The school band had a campaign to raise funds.


They sold boxes of chocolate almonds.

In September they sold 4000, in October 1500, in November 3750, and in December they sold 5250.

Draw a pictograph to show the information. Give the graph a title.

Use  to show 1000 boxes. What would each show:  ,  ,  ?

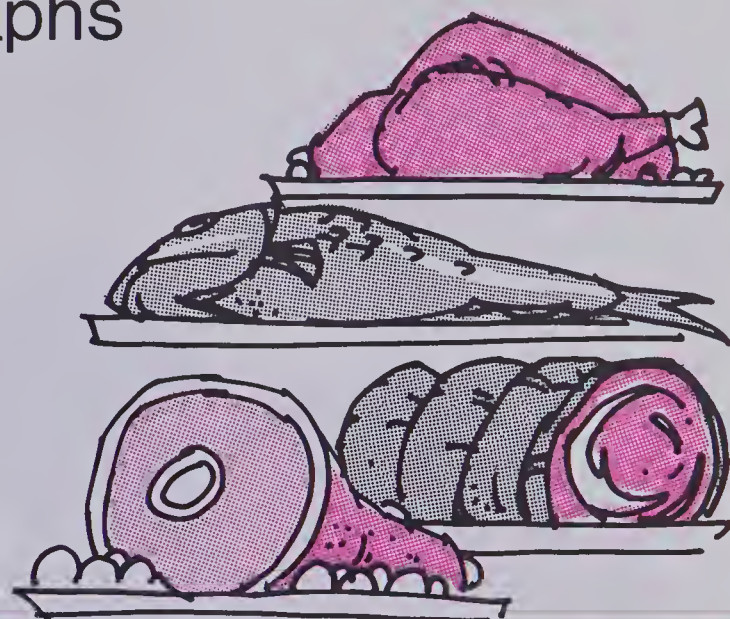
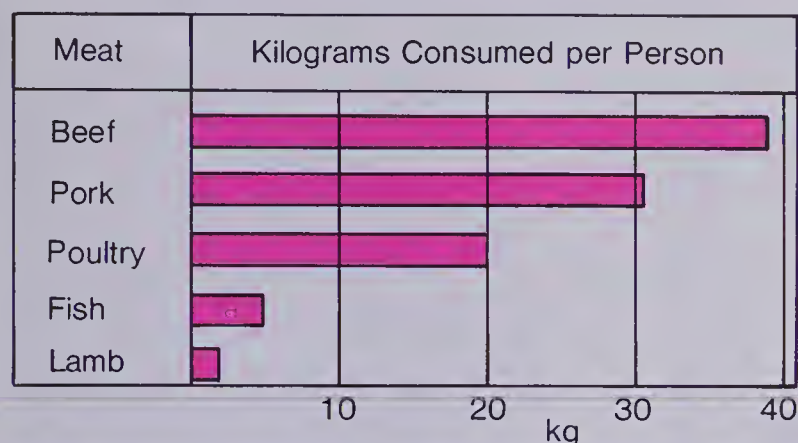
- A car-manufacturing plant produced 3000 cars in July, 250 in August, 1250 in September, and 4750 in October.

Show the data in a pictograph. Be certain to show all the parts necessary to make a good pictograph. Use  = 500 cars.

# Bar Graphs

Bar graphs are used to compare data.

Canada — Amount of Meat Consumed



## Exercises

Use the display.

- Which meat is eaten most often? least often?
  - About how many times more beef is eaten than poultry? than fish?
  - About how many times more pork is eaten than fish? than lamb?
  - About how many kilograms of pork are eaten per person annually?
  - Do you think a similar graph drawn for Australia would be the same? Why?
- The number of foreign-made cars sold in Canada in a year is listed: Toyota — 33 000; Datsun — 28 000; Volkswagen — 22 000; Fiat — 7500; Honda — 18 000; Others — 6000.

Draw a bar graph to show the data. Label fully.
- Use the library. Collect data to make a bar graph of the lengths of these rivers: Amazon, Nile, Mississippi, Mackenzie, Volga, and St. Lawrence.
- Use the library. Collect data to make a bar graph of the population of these cities: New York; London, England; Tokyo; Montreal; Paris; and Hong Kong.



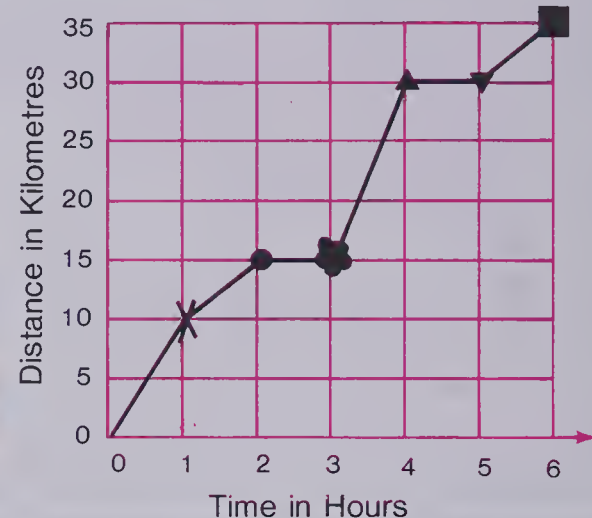
# Time and Distance

A broken line graph is often used to show *change* over several periods of time.

Tewari went on a bike trip.  
He recorded the distance he  
was from home after each hour.



Distance Tewari Was from Home



## Exercises

Refer to the graph above.

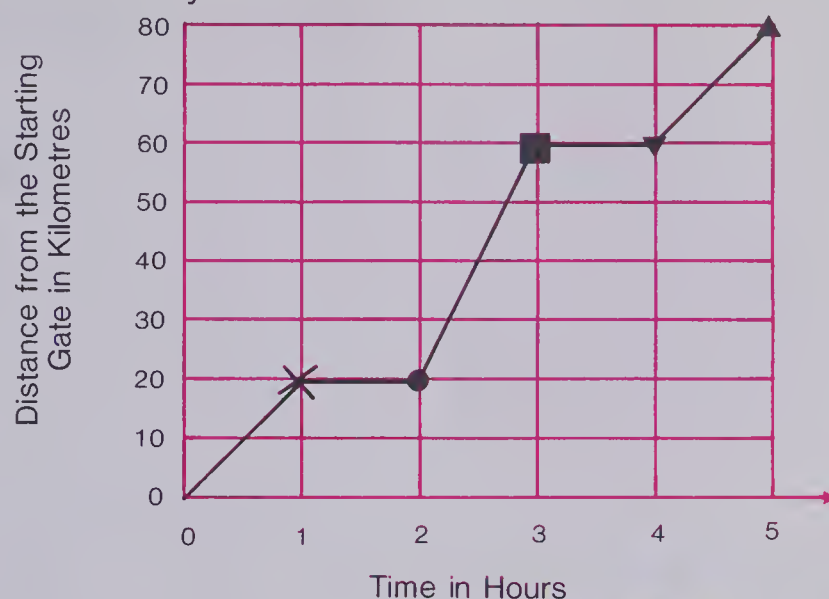
1. After 1 h he was 10 km from home.  
He placed an X at the point (1,10).  
What does (1,10) represent?
2. After 2 h he was 15 km from home.  
He placed a ● at a point to represent this.  
What is the ordered pair for the point ●?
3. How far was he from home after 3 h?
4. How far was he from home after 4 h?
5. What does the point marked ▲ represent?
6. When did Tewari rest on the trip?
7. In which hour did Tewari travel the greatest distance?

## BRAINTICKLER

A **palindrome** reads the same forward as backward.  
The years 1661, 1771, and 1881 are palindromes.  
What years are the next *three* palindromes?

During a car rally Black Cat's progress was recorded on this broken line graph.

Car Rally Record for Black Cat

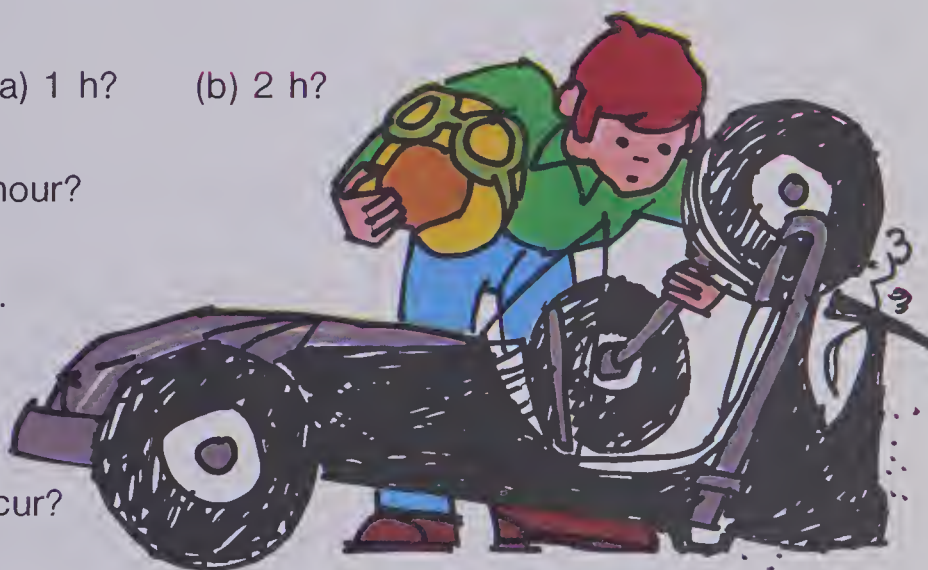


8. How far had Black Cat travelled in (a) 1 h? (b) 2 h?

9. How far did Black Cat go in the 5th hour?

10. Black Cat had a breakdown after 1 h. How does the graph show this?

11. Black Cat had a second breakdown. When did the second breakdown occur?



12. During which two hours did Black Cat travel the farthest?

13. (a) Draw a broken line graph similar to the one above for The Blue Streak in the same car rally.

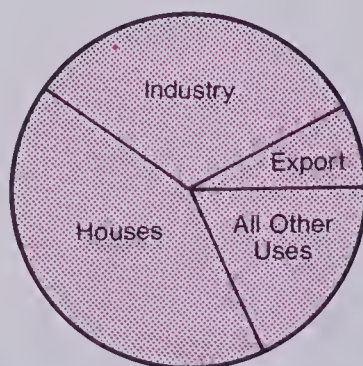
Time (h)	0	1	2	3	4	5	6	7	8
Distance from Starting Gate (km)	0	10	60	80	80	140	160	160	200

(b) When did the driver stop to rest?



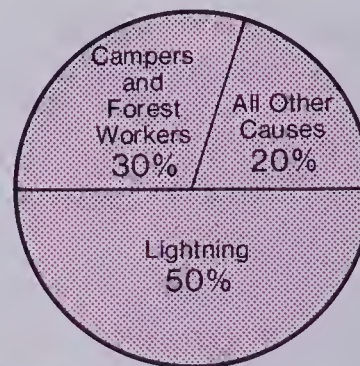
# Circle Graphs

How Lumber Is Used



The largest use of lumber is in house construction.

Causes of 380 Forest Fires in Blue Lake Park



Lightning is the biggest cause of forest fires in this park.

## Exercises

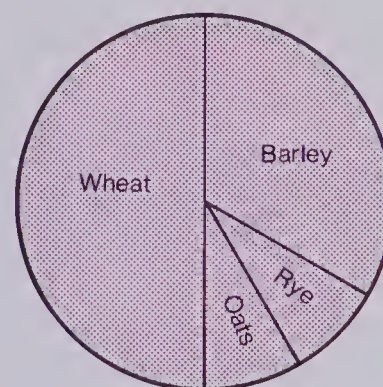
We can use circle graphs to *compare* and *find* facts quickly.

1. According to the graph, what happens to the smallest portion of the lumber?
2. About what portion of all the lumber is used in industry?
3. What does "all other uses" mean? List some other uses.
4. The amount of lumber used altogether in "all other uses" and "export" is about the same as what other use?
5. Approximately what portion of the lumber is used in houses?
6. What portion of all forest fires is caused by lightning?
7. What is meant by "all other causes"? List some other causes.
8. About what portion of all forest fires is caused by campers and forest workers?
9. *How many* forest fires were caused by lightning? by campers and forest workers? by all other causes?



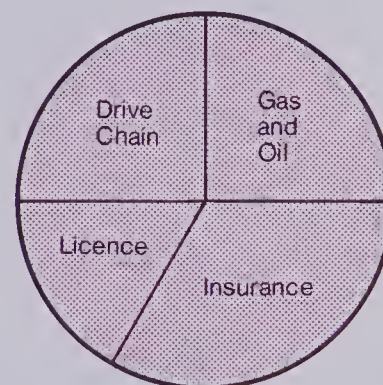
10. (a) What is the circle graph about?
- (b) From which crop does Farmer Elias have the largest income? the smallest income?
- (c) About one third of the income is from which crop?
- (d) About what portion of the income is from wheat?
- (e) What two crops yield about the same income?

Farmer Elias' Income from Crops



11. (a) What portion of all cost was gas and oil?
- (b) About how much did he spend on a drive chain? on oil and gas?
- (c) What fraction of all cost was the licence? insurance?
- (d) What fraction of all cost were the licence and insurance together?

Jay's Cost of Operating His Motorbike



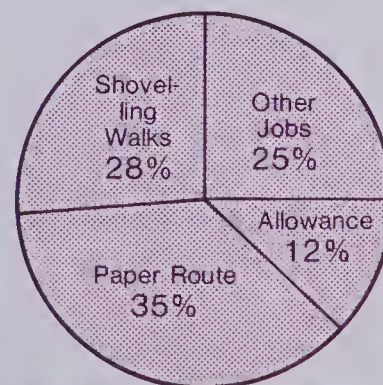
Total cost is \$36.

12. Copy and complete the table.

Source	Amount
Allowance	
Paper route	
Shovelling sidewalks	
Other jobs	
Total	

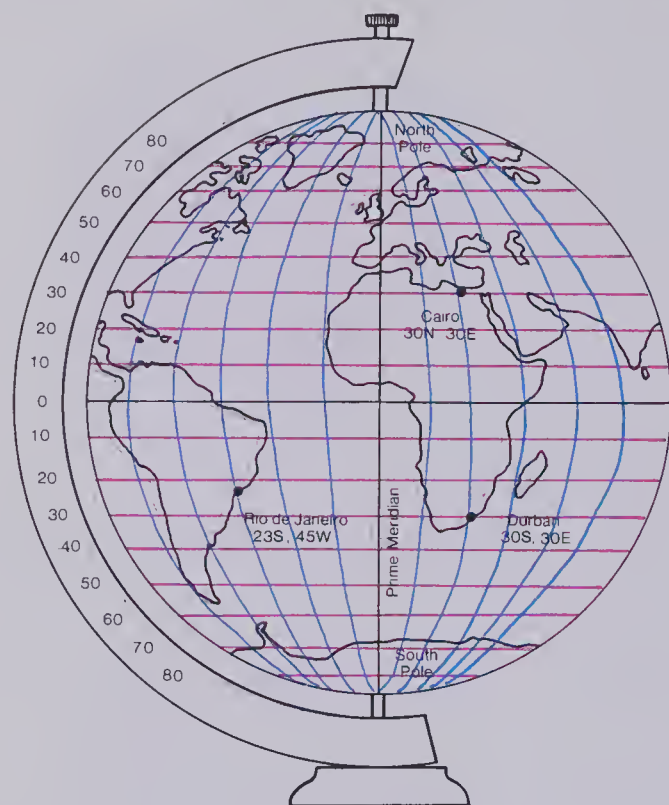
How can you check your work?

Debbie's Income



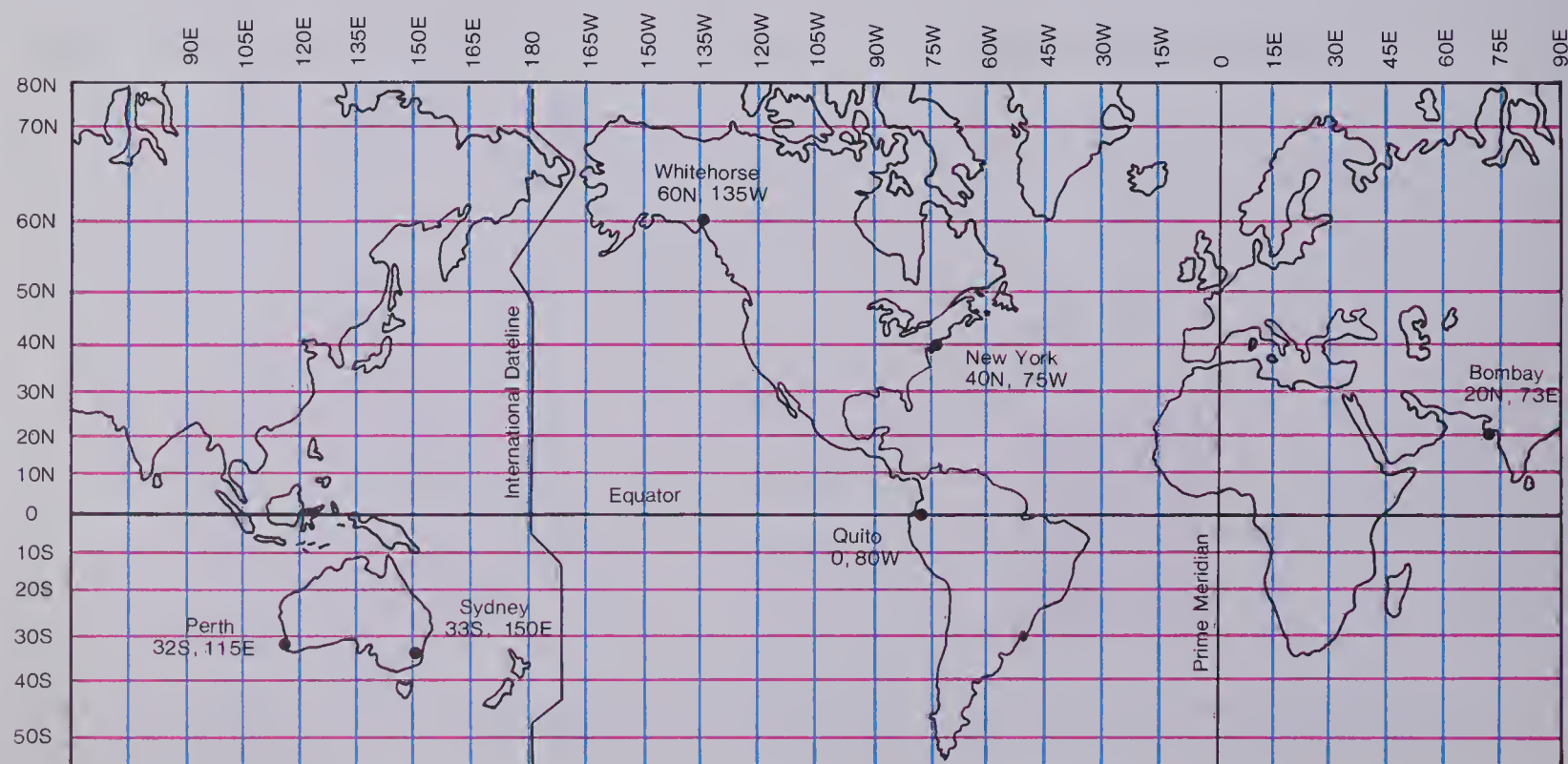
Total income is \$400.

# Latitude and Longitude



A globe is a model of the earth. To help locate points on the earth, geographers have agreed to draw lines of **longitude** (*blue*) and **latitude** (*red*) on the model to form a grid.

This map of the world has been transformed onto a flat surface. The lines of longitude and latitude have been drawn in colour:  
longitude — *blue*  
latitude — *red*.



## Exercises

1. The equator is a line of latitude. What is its number?
2. As we leave the equator and move toward the North Pole, the lines of latitude are numbered 10N, 20N, . . . . What does the N indicate?
3. As we leave the equator and move toward the South Pole, the lines of latitude are numbered 10S, 20S, . . . . What does the S indicate?
4. Name a place on (a) 20N, (b) 30S, (c) 60N, (d) 32S, (e) Equator.
5. Lines of longitude go from the North Pole to the South Pole.  
Longitude lines are numbered starting with 0.  
Name two countries through which the zero longitude line passes.
6. As we go east from the 0 line, the longitude lines are numbered 15E, 30E, . . . .  
What does the E indicate?
7. As we go west from the 0 line, the longitude lines are numbered 15W, 30W, . . . .  
What does the W indicate?
8. How high are the lines of longitude numbered? How high are the lines of latitude numbered?
9. Name a place on each line.  
(a) 75W                      (b) 115E                      (c) 30E                      (d) 135W                      (e) 150E
10. Locate these places.  
(a) Moscow — 55N, 40E                      (b) Ottawa — 45N, 75W  
(c) Fiji Islands — 20S, 179E                      (d) Rio de Janeiro — 23S, 45W
11. What city is identified by each location?  
(a) 60N, 135W                      (b) 40N, 75W                      (c) 20N, 73E  
(d) 30N, 30E                      (e) 30S, 30E                      (f) 0, 80W

## Activity

Use a globe or map on which longitude and latitude lines are drawn. Work with a partner.

Name a city or place with its longitude and latitude (20N, 75E).

Challenge your partner to find it in 1 min. Take turns.

The person locating the most places is the winner. Make your own rules.



# Chapter Test

Write related sentences to solve each.

1.  $N + 5 = 9$

2.  $N - 6 = 13$

3.  $N \times 4 = 48$

4.  $N \div 3 = 12$

Calculate.

5.  $+3 + -5$

6.  $-5 + -7$

7.  $-4 + +9$

8.  $+3 - +2$

9.  $+5 - -4$

Graph the solutions.

10.  $M + 6 = 9.5$

11.  $N \div 0.3 = 20$

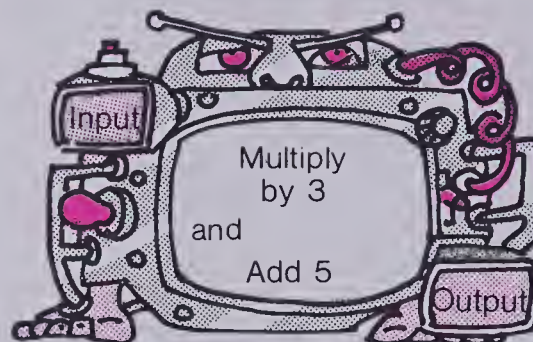
Complete each table.

12.



Input	0	1	2	5	10
Output					

13.



Input	0	1	2	5	8
Output					

14. Draw and label a graph to show these ordered pairs.

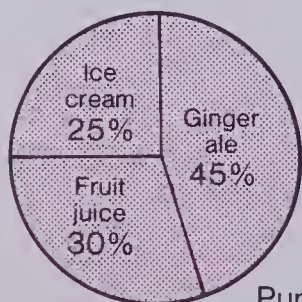
$(5,2)$ ,  $(4,-3)$ ,  $(-2,5)$ ,  
 $(0,-4)$ ,  $(-2,-5)$ ,  $(-4,0)$

15. Draw a broken line graph to show these data recorded at a car rally.

Log Record of Grasshopper

Time (h)	0	1	2	3	4	5
Distance from Starting Gate (km)	0	80	80	180	300	450

16.



Punch recipe

Brian wants to make 8 L of fizzy-float. How much ice cream does he need?

# Cumulative Review

Add.

$$\begin{array}{r} 1. \quad 23 \\ 645 \\ 56 \\ + 3479 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 11.45 \\ 3.57 \\ 4.03 \\ + 38.59 \\ \hline \end{array}$$

Subtract.

$$\begin{array}{r} 3. \quad \$4651.28 \\ - 1976.49 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 8.103 \\ - 0.698 \\ \hline \end{array}$$

Multiply.

$$\begin{array}{r} 5. \quad 259 \\ \times 36 \\ \hline \end{array}$$

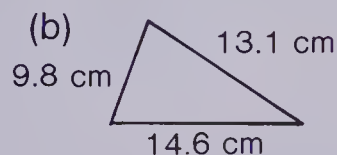
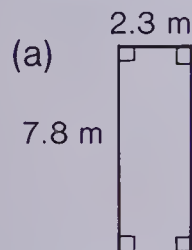
$$\begin{array}{r} 6. \quad 852.1 \\ \times 1.6 \\ \hline \end{array}$$

Divide.

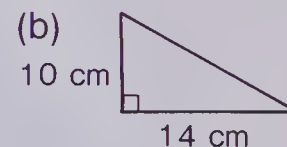
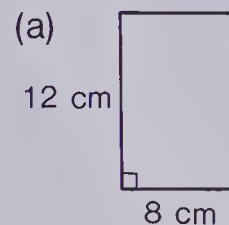
$$7. \quad 2.5 \overline{)75}$$

$$8. \quad 2.3 \overline{)12.88}$$

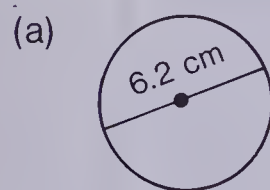
9. Calculate the perimeter.



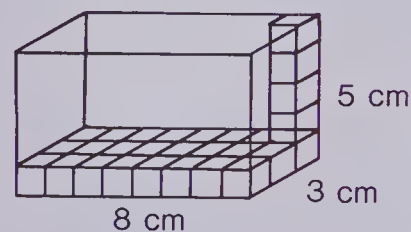
10. Calculate the area.



11. Calculate the circumference ( $\pi = 3.1$ ).



12. Calculate the volume.



Calculate.

$$13. \quad \frac{1}{4} + \frac{1}{8}$$

$$14. \quad \frac{7}{10} - \frac{2}{5}$$

$$15. \quad \frac{4}{5} \times \frac{3}{5}$$

$$16. \quad \frac{2}{5} \div \frac{2}{3}$$

Calculate.

$$17. \quad 26\% \text{ of } 40$$

$$18. \quad \text{Find } \times: \frac{3}{7} = \frac{\times}{21}$$

19. A bank charges 12% interest each year.  
What is the interest on a loan of \$550?



# Chapter 11

# Transformational Geometry

Symmetry

Flips, Slides, and Turns

Constructions





# Tune Up

Calculate.

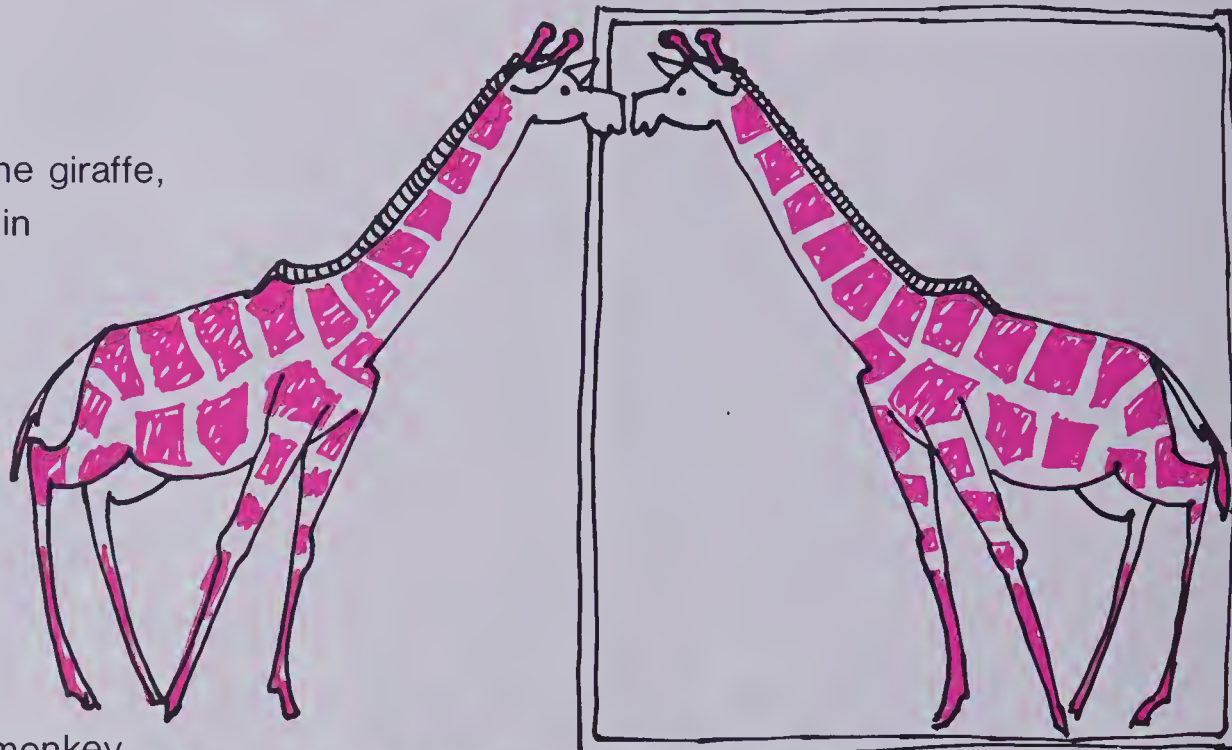
- |   |   |   |   |
|---|---|---|---|
| 1. (a) $6 \times 0.1$<br>(b) $6 \times 0.01$<br>(c) $6 \times 0.001$<br>(d) $6 \times 0.0001$ | 2. (a) $0.1 \times 3$<br>(b) $0.01 \times 3$<br>(c) $0.001 \times 3$<br>(d) $0.0001 \times 3$ | 3. (a) $26 \times 0.1$<br>(b) $26 \times 0.01$<br>(c) $26 \times 0.001$<br>(d) $26 \times 0.0001$ | 4. (a) $0.1 \times 14.2$<br>(b) $0.01 \times 14.2$<br>(c) $0.001 \times 14.2$<br>(d) $0.0001 \times 14.2$ |
| 5. (a) $0.1 \times 0.1$<br>(b) $0.1 \times 0.01$<br>(c) $0.1 \times 0.001$                    | 6. (a) $200 \times 300$<br>(b) $200 \times 320$<br>(c) $200 \times 340$                       | 7. (a) $250 \times 300$<br>(b) $250 \times 330$<br>(c) $250 \times 360$                           | 8. (a) $160 \times 200$<br>(b) $160 \times 210$<br>(c) $160 \times 220$                                   |
| 9. (a) $100 \div 10$<br>(b) $10 \div 10$<br>(c) $1 \div 10$                                   | 10. (a) $100 \div 100$<br>(b) $10 \div 100$<br>(c) $1 \div 100$                               | 11. (a) $100 \div 1000$<br>(b) $10 \div 1000$<br>(c) $1 \div 1000$                                | 12. (a) $32 \div 32$<br>(b) $32 \div 3.2$<br>(c) $32 \div 0.32$   |
| 13. (a) $42 \div 10$<br>(b) $42 \div 100$<br>(c) $42 \div 1000$                               | 14. (a) $42 \div 0.1$<br>(b) $42 \div 0.01$<br>(c) $42 \div 0.001$                            | 15. (a) $10 \div 0.1$<br>(b) $10 \div 0.01$<br>(c) $10 \div 0.001$                                | 16. (a) $100 \div 0.1$<br>(b) $100 \div 0.01$<br>(c) $100 \div 0.001$                                     |
| 17. (a) $7.8 \div 6$<br>(b) $12.4 \div 3.1$<br>(c) $25.44 \div 5.3$                           | 18. (a) $13.5 \div 9$<br>(b) $1.84 \div 2.3$<br>(c) $514.5 \div 4.9$                          | 19. (a) $12.8 \div 32$<br>(b) $11.6 \div 2.9$<br>(c) $330 \div 7.5$                               | 20. (a) $71.3 \div 2.3$<br>(b) $7.04 \div 3.2$<br>(c) $30.09 \div 1.7$                                    |

# Slides, Flips, and Turns

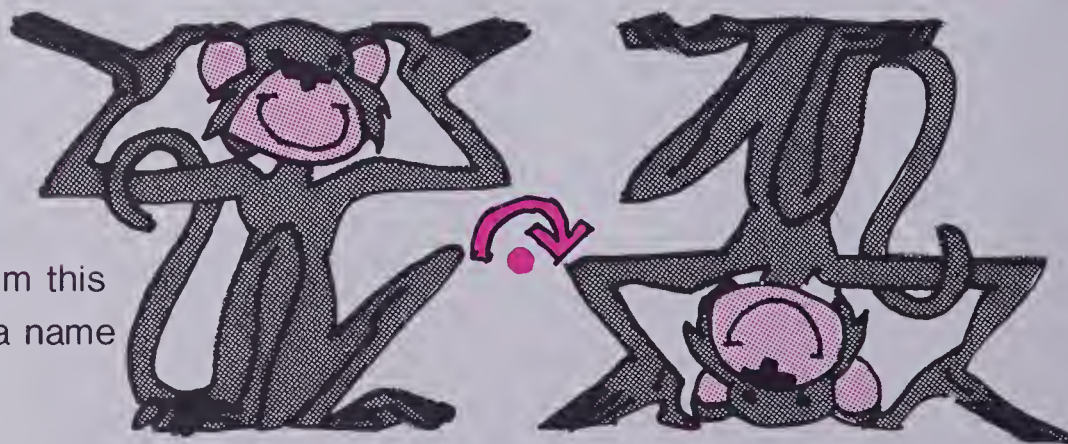
1. Polly, the parrot, slid along her roost.



2. Lonesome Harry, the giraffe, sees his reflection in the mirror.



3. Flipping Fred, the monkey, has turned to sit on his head.



4. Choose animal cartoons from this or other books. Give each a name and show them in:

- (a) slides
- (b) reflections (flips)
- (c) turns (rotations)

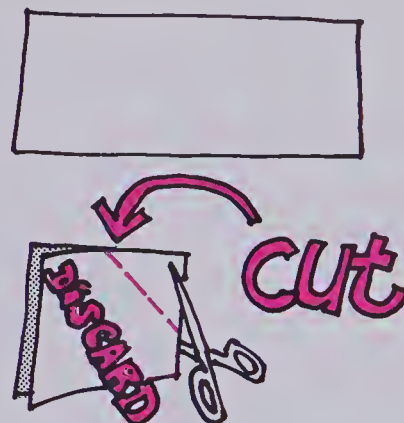
Colour.

# Folding, Cutting, and Measuring

1. Fold a piece of paper once and cut off a corner as shown.

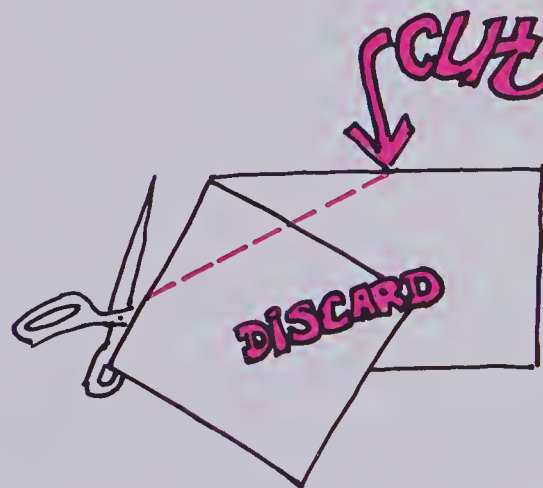
Open the shape.

- (a) Measure the angles and sides.
- (b) Name the shape you have.
- (c) Draw on the line of symmetry.



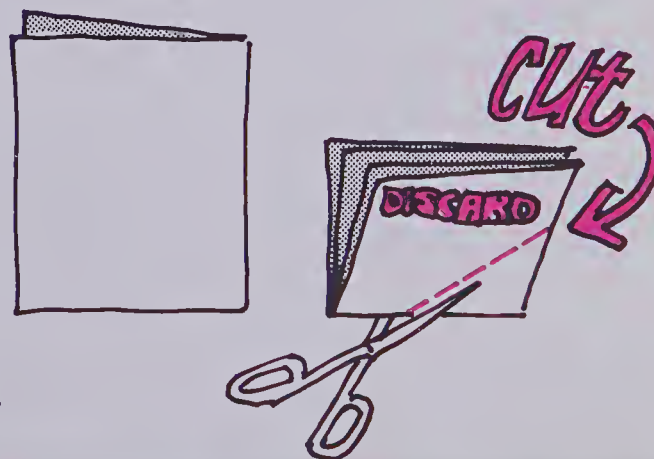
2. Fold a piece of paper once with an oblique fold.

- (a) Predict the shape you will get when you cut off the corner.
- (b) Cut off the corner.  
Was your prediction correct?
- (c) Measure the sides and angles.  
Name the shape you have.
- (d) Draw on the lines of symmetry.



3. Fold a piece of paper twice as shown.

- (a) Predict the shape you will get when you cut off the corner.
- (b) Cut off the corner. Open it.  
Was your prediction correct?
- (c) Draw on the lines of symmetry.
- (d) Name the shape you have.
- (e) Fold another piece of paper twice as shown.  
Can you cut it to produce a square?





# Reflections

Draw the mirror image  
of  $\triangle ABC$ .

Corresponding vertices:

$A \rightarrow A'$

$B \rightarrow B'$

$C \rightarrow C'$

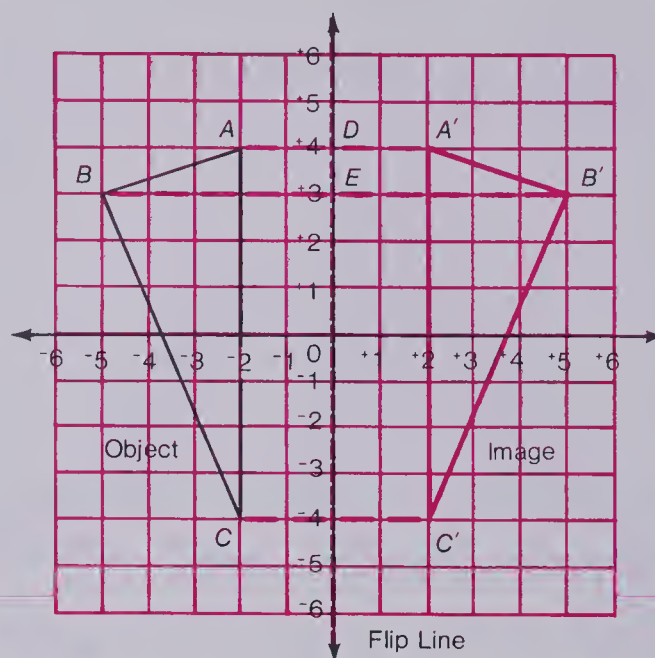
Corresponding sides:

$AB \rightarrow A'B'$

$BC \rightarrow B'C'$

$AC \rightarrow A'C'$

$\triangle A'B'C'$  is a reflection of  $\triangle ABC$ .



Check using  
a transparent  
mirror.

## Exercises

1. Look at  $\triangle ABC$  and its reflection above.

(a) Is line  $AA'$  parallel to line  $BB'$ ?

(b) Is line  $AA'$  at right angles to the flip line?

(c) Is line  $BB'$  at right angles to the flip line?

(d) Is  $AD = A'D$ ?

(e) Is  $BE = B'E$ ?

2. Draw  $\triangle RST$  on a grid.

Draw the mirror image.

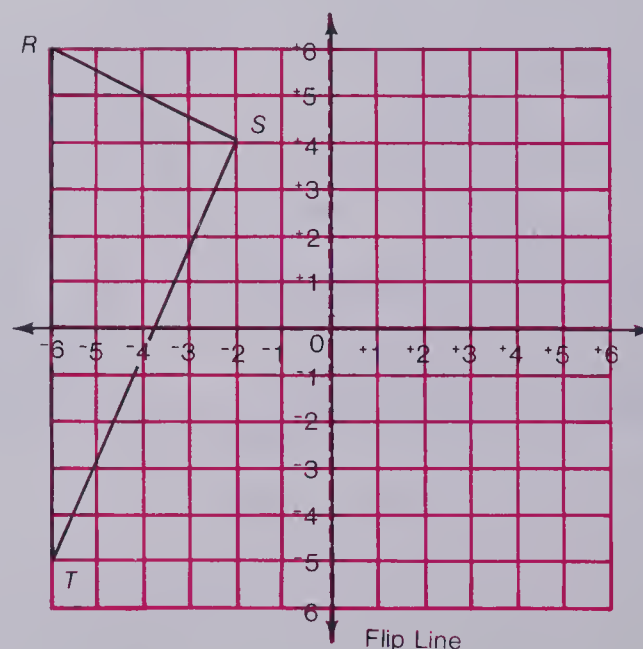
Label each vertex.

(a) Name the corresponding:

(i) vertices

(ii) sides

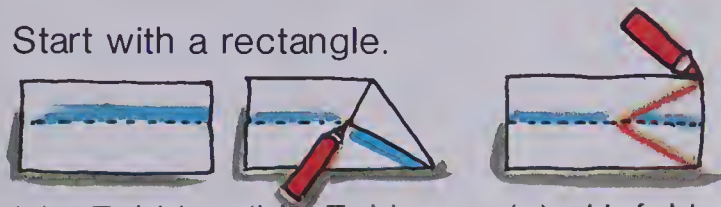
(b) Are the two triangles congruent?



# Regular Polygons and Symmetry

Follow the steps to make each polygon.

1. Start with a rectangle.



- (a) Fold in half. Unfold.  
(b) Fold one corner to crease line and mark point.  
(c) Unfold. Draw lines.

(d) Cut out an **equilateral triangle**.

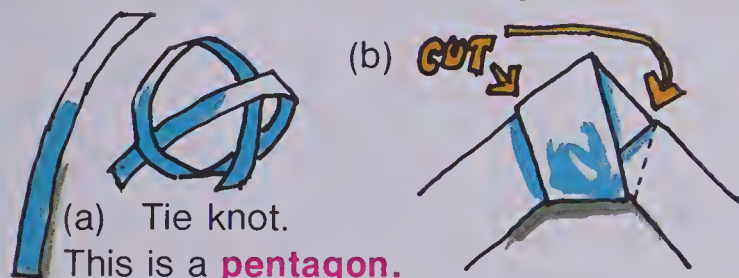
2. Start with a rectangle.



- (a) Fold, and draw line.  
(b) Cut off top. Unfold.

This is a **square**.

3. Start with a narrow rectangle.



- (a) Tie knot.  
This is a **pentagon**.

4. Start with an equilateral triangle.



- (a) Fold in corners to centre.

This is a **hexagon**.

5. Start with a rectangle.



- (a) Fold corners.  
(b) Cut along crease line to produce a **parallelogram**.

6. Start with a rectangle.



- (a) Fold. (b) Fold again and cut. Unfold.

This is a **rhombus**.

7. Use the above polygons. Draw on all lines of symmetry.

★ 8. List the properties of each shape:

- (a) equilateral triangle (b) square (c) pentagon (d) hexagon (e) parallelogram  
(f) rhombus

# Corresponding Parts in Slides

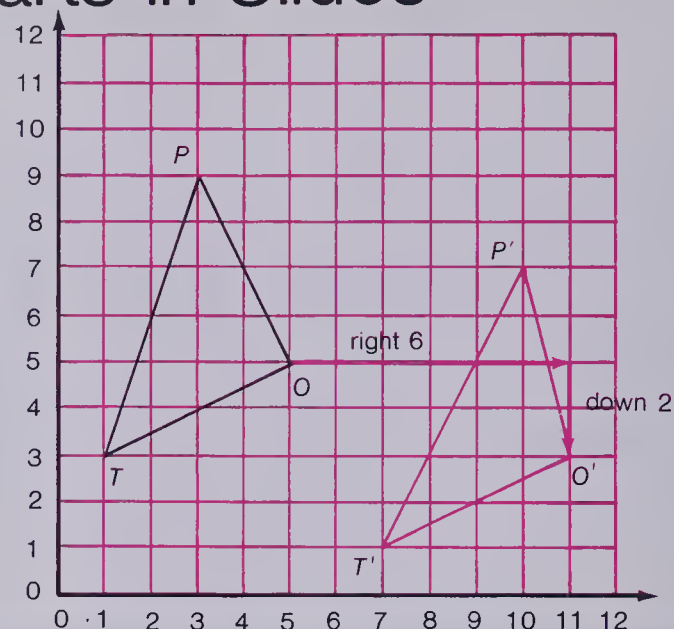
We can draw the image of a shape given the position of one corresponding vertex of the image.

$T'$  is the image of  $T$ .

Construct the slide image of  $\triangle TOP$ .

**Step 1** To go from  $T$  to  $T'$  is a slide using the rule “right 6, down 2”.

**Step 2** Locate  $O'$  and  $P'$  using the “right 6, down 2” rule.

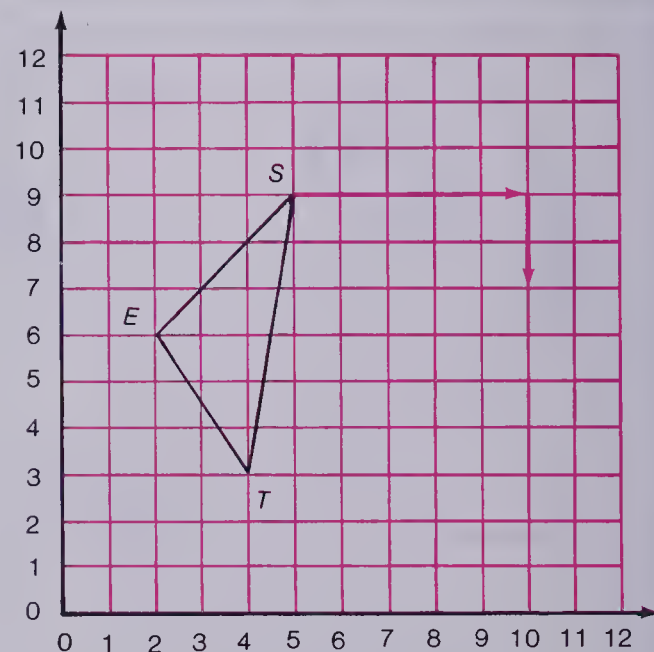
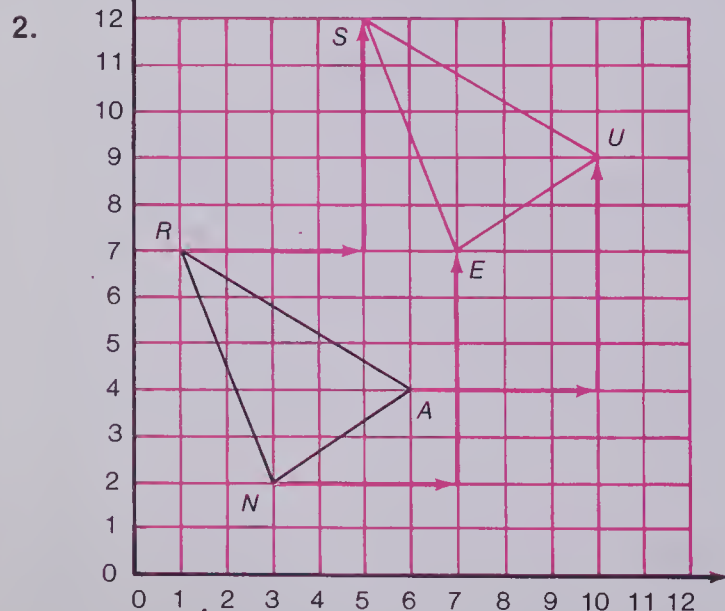


## Exercises

Use graph paper labelled as shown. Draw  $\triangle SET$ .

$S \rightarrow (5,9)$     $E \rightarrow (2,6)$     $T \rightarrow (4,3)$

1. The image of  $S$  is  $S' \rightarrow (10,7)$ .
  - (a) How far right? down?
  - (b) To locate  $T'$ , we use the rule “right ■, down ■”.
  - (c) Locate  $E'$  using the rule.
  - (d) Draw  $\triangle S'E'T'$ .



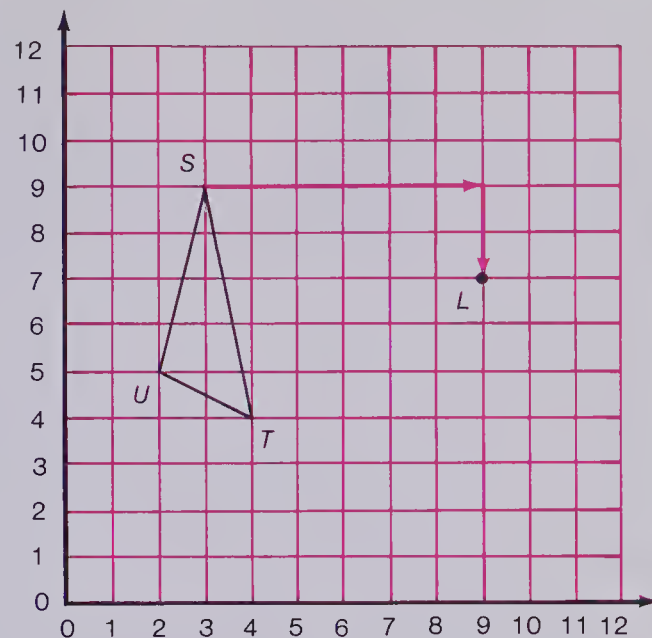
$\triangle SUE$  is the slide image of  $\triangle RAN$ .

Name the corresponding:

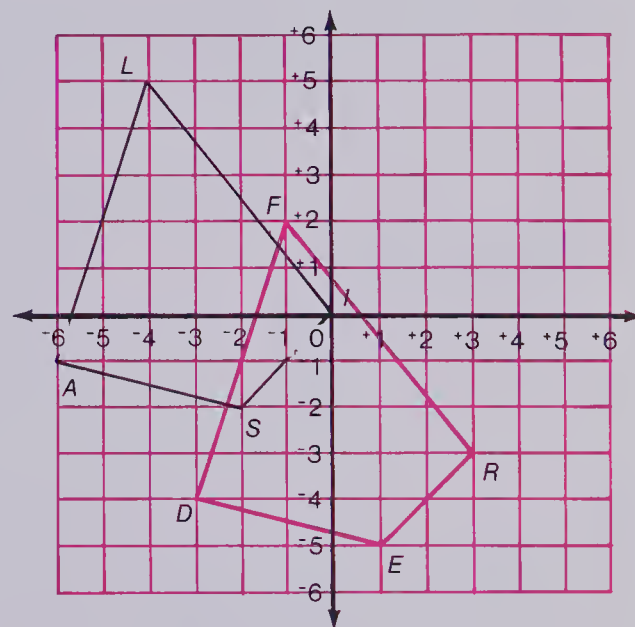
- (a) vertices      (b) sides      (c) angles
- (d) Write the ordered pairs of each set of corresponding vertices.



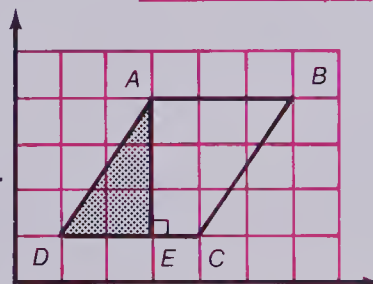
3.  $\triangle STU$  and  $\triangle LEA$  will show a slide.
- Find the rule and complete  $\triangle LEA$ .
  - Draw lines connecting corresponding vertices.  
Are these lines parallel?
  - Are  $\triangle STU$  and  $\triangle LEA$  congruent?



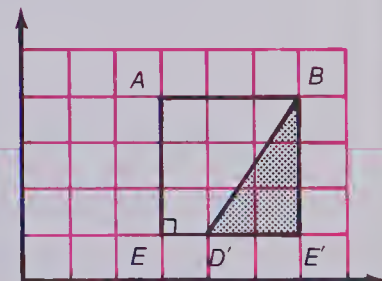
4.  $FRED$  and  $LISA$  are related by a slide.  
Write a statement about:
- $FR$  and  $LI$
  - $\angle FRE$  and  $\angle LIS$
  - segment  $FL$  and segment  $DA$
  - $FRED$  and  $LISA$



5. Draw the parallelogram  $ABCD$ .  
Draw  $AE$ .  
Slide  $\triangle AED$  right so that  $AD$  is matched to  $BC$ .

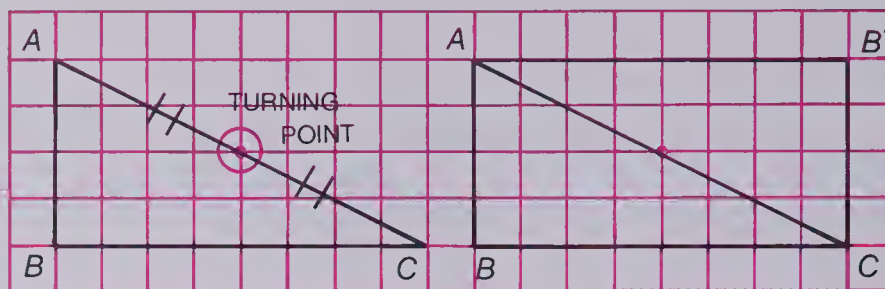


- Will the area of the parallelogram  $ABCD$  be the same as the area of rectangle  $ABE'E$ ? Why?
- Calculate the area of the rectangle.
- Calculate the area of the parallelogram.



# Rotations

Draw  $\triangle ABC$  on graph paper.  
Make a cutout of this triangle.  
Rotate the triangle  
 $\frac{1}{2}$  turn about the  
turning point.  
Trace the image.

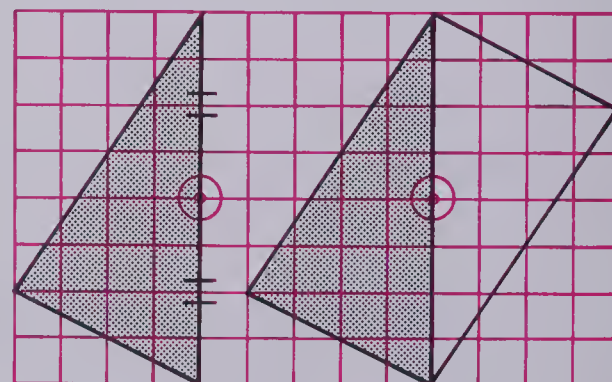
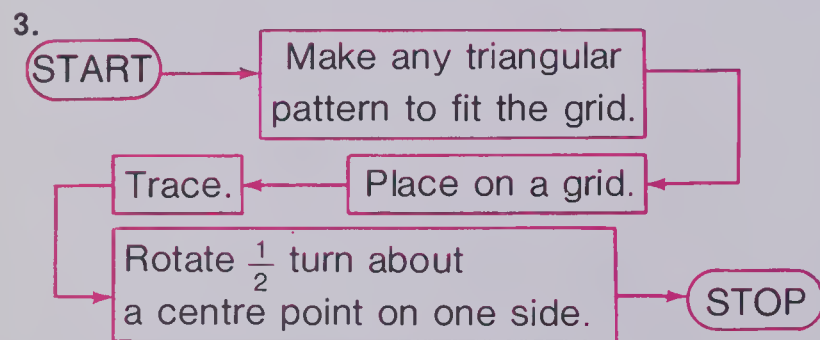
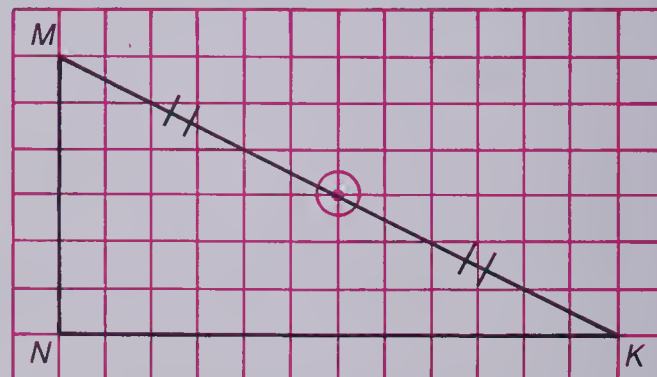


## Exercises

Refer to the display.

1. (a) What is the shape made by the two triangles?  
(b) Compare the areas of the rectangle and the triangle. Which is larger and by how much?  
(c) Name the corresponding (i) vertices, (ii) sides.

2. Repeat the steps in the display using this triangle.  
Answer the questions in Exercise 1.



- (a) What is the name of the new shape formed?
- (b) How many triangles make the parallelogram?
- (c) Compare the areas of the parallelogram and the triangle.  
Which is larger and by how much?

- ★4. Half turn the trapezoid  $ABCD$  around the turning point.

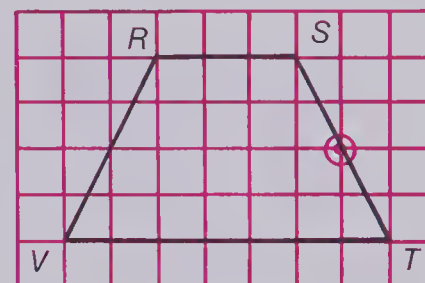
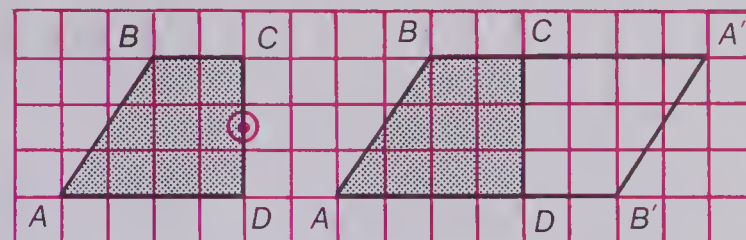
(a) What is the name of the shape  $ABA'B'$ ?

(b) How many trapezoids make a parallelogram?

(c) Compare the areas of the parallelogram with the original trapezoid. Which is bigger and how much?

(d) Name the corresponding  
(i) vertices, (ii) sides.

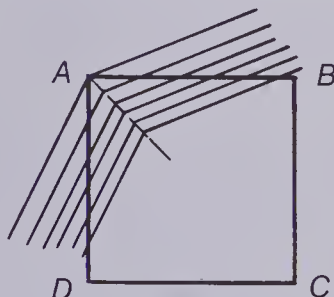
- ★5. Repeat Exercise 4 for trapezoid  $RSTV$ .



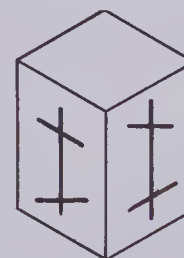
## Optical Illusions

Things are *not* always what they appear! Answer each question, and *then* measure to check.

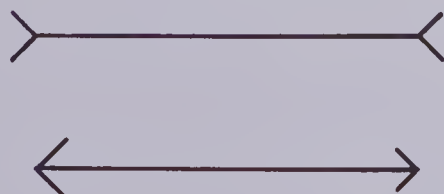
1. Is  $\angle A$  a square corner?



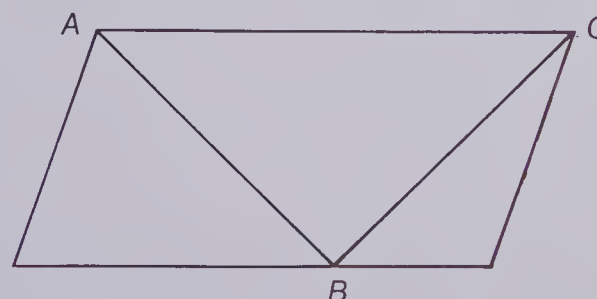
2. Which angles are *actually* right angles?



3. Which is longer?



4. Which is longer,  $AB$  or  $BC$ ?





# Rotational Symmetry

- Trace, label, and cut out the pattern in Figure 1.

Place it on your page and trace it. Label it in your book as shown in Figure 1.

Put a pin at .

Turn it  $\frac{1}{3}$  of a turn until it fits the original drawing as shown in Figure 2.

Note that the shape fits.

Turn it again  $\frac{1}{3}$  of a turn. Does it fit again?

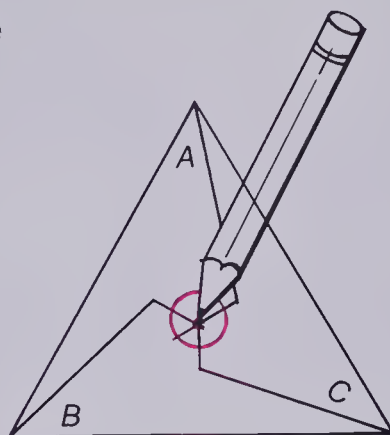


Figure 1

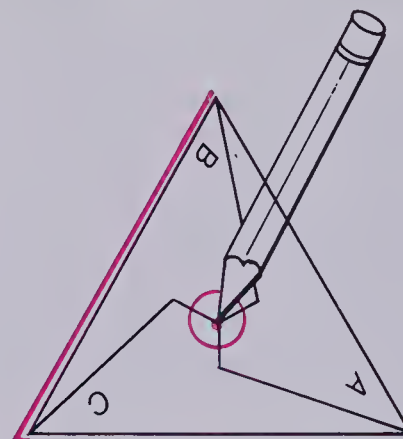
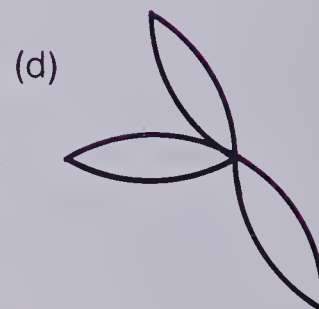
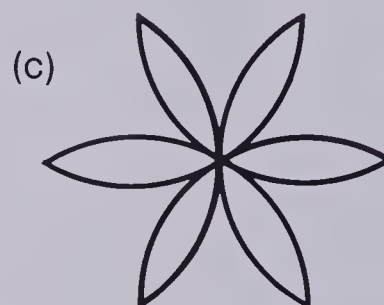
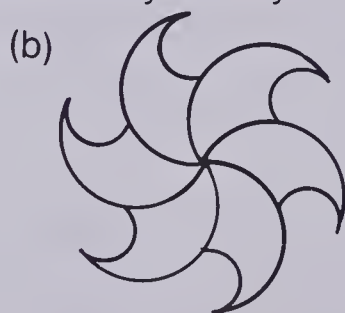
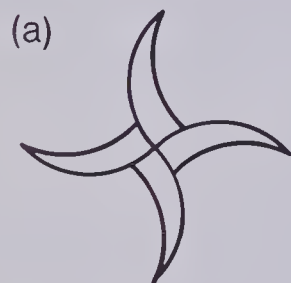


Figure 2

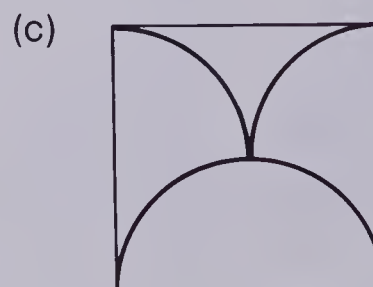
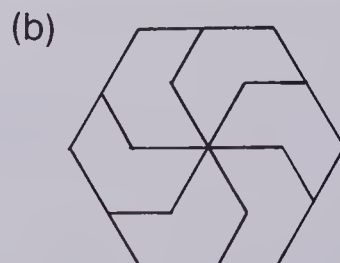
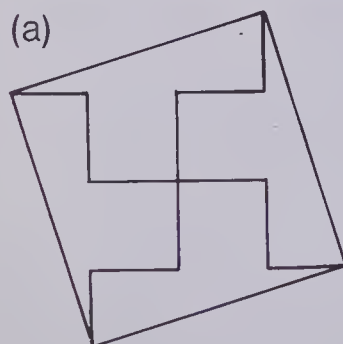
This shape has  
**rotational symmetry.**

- Trace and cut out each of the following shapes.

Which ones have rotational symmetry?



- Trace. Which ones have rotational symmetry?



- Create 3 designs that have rotational symmetry.

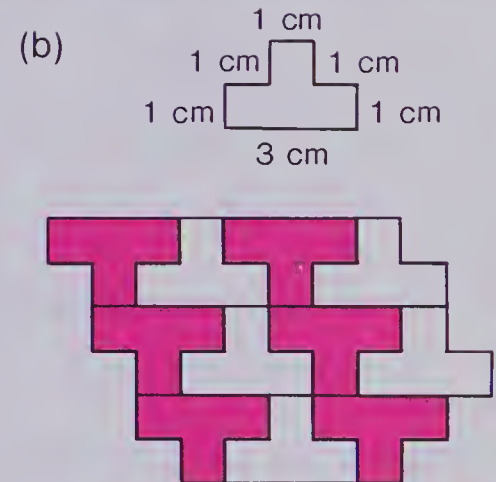
# Tessellations

A **tessellation** is a repeated pattern that can be used to cover a surface.

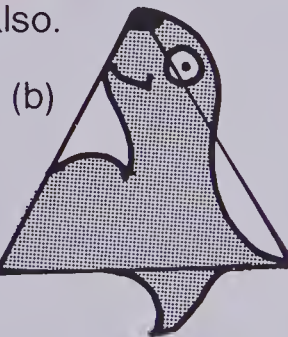
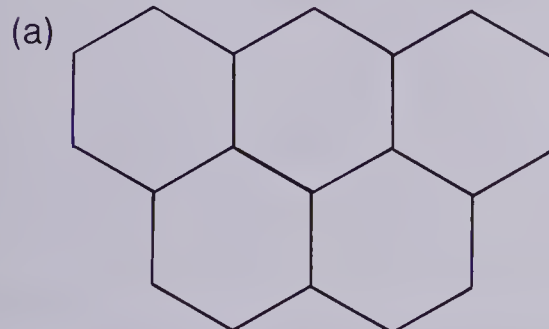
## Exercises

1. Make each pattern.

Trace it to make a surface-covering pattern. You may want to make patterns using the two shapes together. Colour.

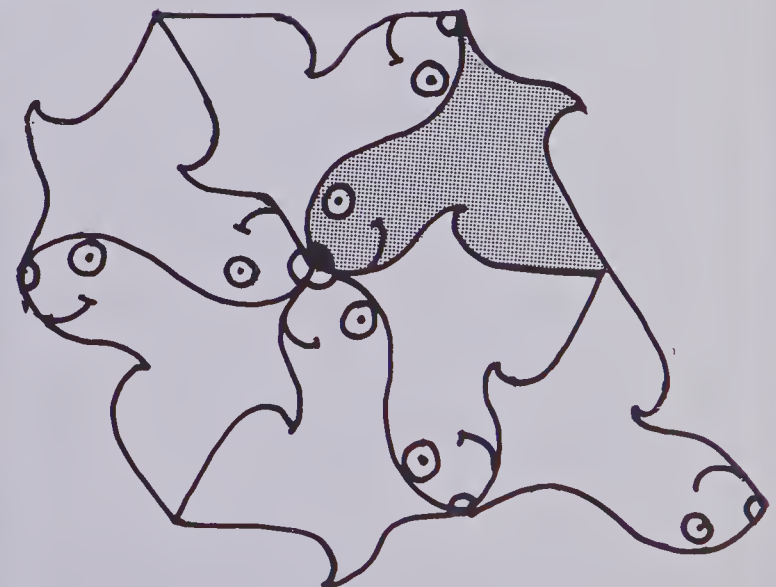
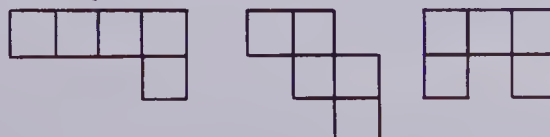


2. Other shapes will cover a surface also.



3. Pentominoes are made from 5 squares attached along at least one complete edge.

- (a) Make all of the different pentominoes.  
 (b) How many different pentominoes are there?  
 (c) How many tessellate?  
 (d) Colour your patterns.



This shape is based on an equilateral triangle. It tessellates. Draw a shape that tessellates.

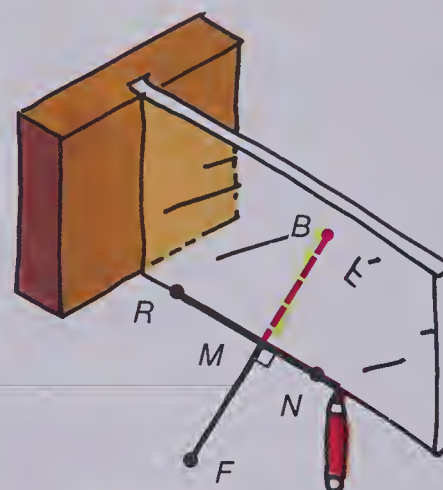
# Perpendicular Bisector

We can use a transparent mirror to construct the perpendicular bisector of a segment.

Place the mirror across  $FB$  so that the image of point  $F$  is on top of point  $B$ .

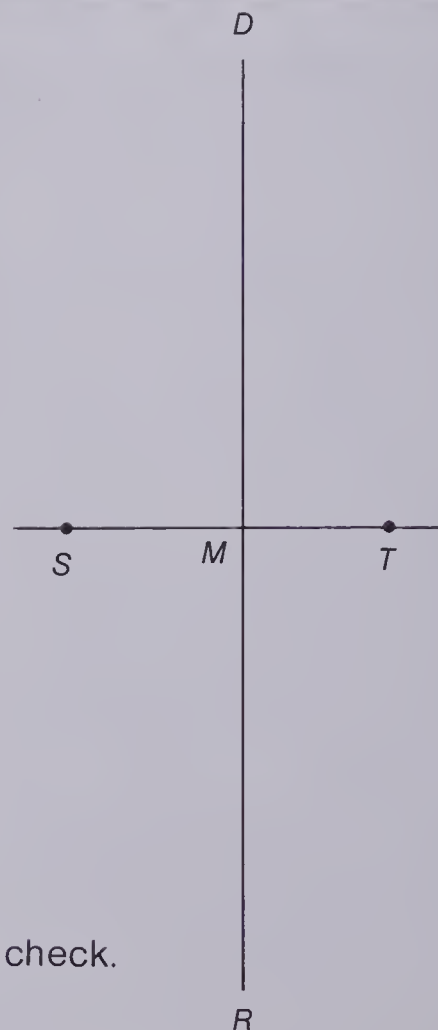
Draw line  $RN$ .

Line  $RN$  is the **perpendicular bisector** of line  $FB$ .



## Exercises

1. Draw a line segment  $DR$  10 cm long.  
Use your plastic mirror to draw the perpendicular bisector as in the diagram.
  - (a) How long is line segment  $DM$ ? line segment  $MR$ ?  
What does *bisect* mean?
  - (b) Measure  $\angle DMS$ .  
What does *perpendicular* mean?
  - (c) Write these instructions in your own words:  
“Draw the perpendicular bisector of segment  $DR$ .”



2. Draw these segments:

- (a) 8 cm                      (b) 12 cm                      (c) 15 cm

Construct the perpendicular bisector of each. Measure to check.

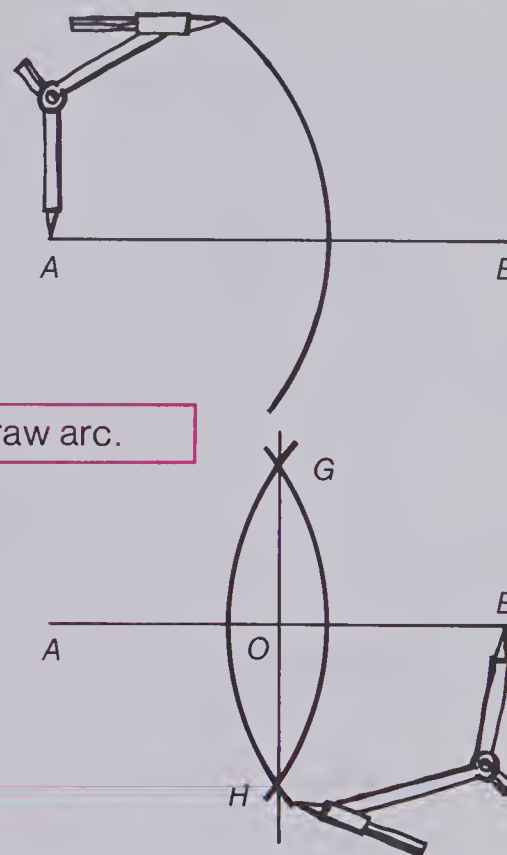
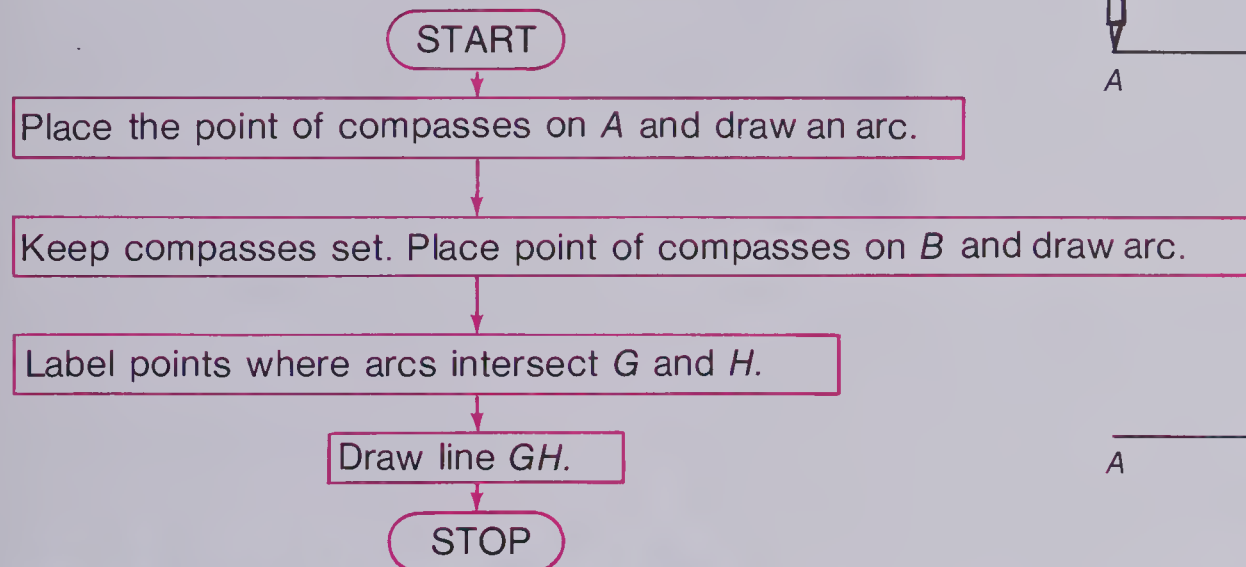
3. Draw a line segment  $RD$ .

Construct three different line segments that are perpendicular to  $RD$ .



# Bisecting the Perpendicular Another Way

We can use compasses and a straightedge to construct the perpendicular bisector of a line segment.



$GH$  is the perpendicular bisector of  $AB$ .  
Use a plastic mirror to check.

## Exercises

1. Draw a line segment  $AB$  in your book.  
Use the above method to construct the perpendicular bisector of the segment.
  - (a) Measure  $\angle AOG$ . Is it  $90^\circ$ ?
  - (b) Measure  $AO$  and  $OB$ . Are they equal?
  - (c) Is it important how far the compasses are opened?
2. Draw a large triangle.
  - (a) Construct the perpendicular bisector of each side.
  - (b) Extend the bisectors so that they intersect.
  - (c) Write a statement about the intersection point.
  - (d) What does *bisect* mean? Write a statement.
3. Draw a line segment  $SD$ .  
Construct three different line segments that are perpendicular to  $SD$ .

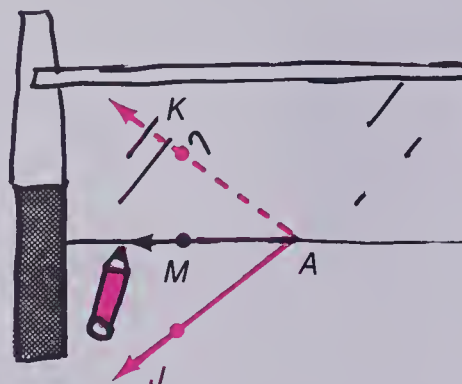
# Angle Bisector

We can use the plastic mirror to bisect an angle.

Place the mirror between the two rays so that the image of ray  $AJ$  fits on ray  $AK$ .

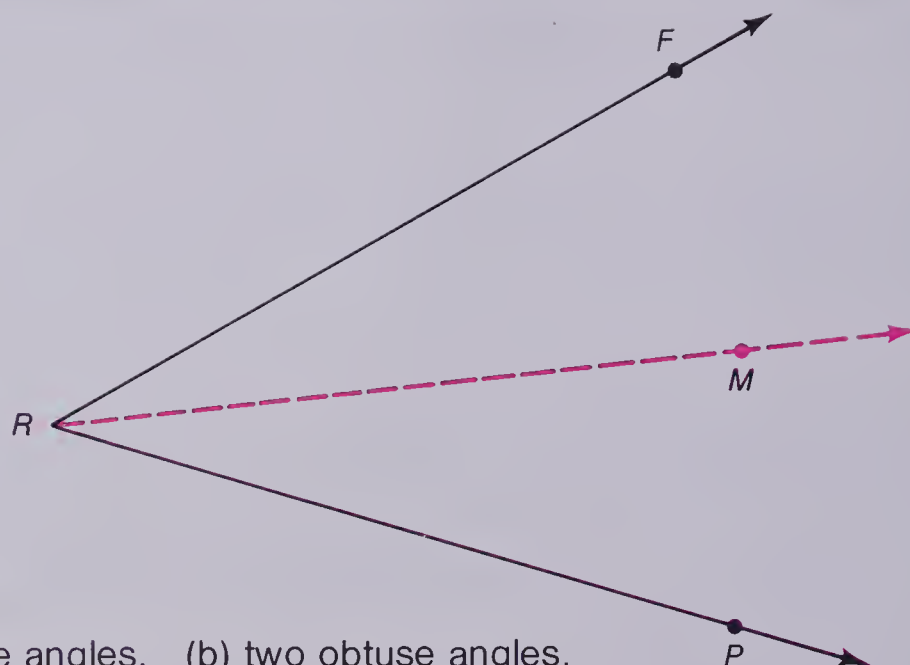
Draw ray  $AM$ .

Ray  $AM$  bisects  $\angle KAJ$ .



## Exercises

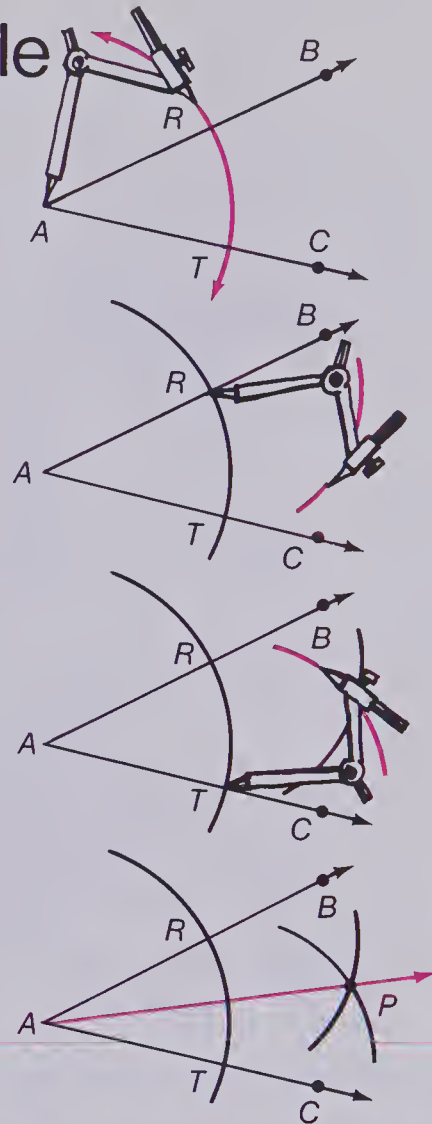
1. Draw a large angle  $FRP$ .  
Use your mirror to bisect it.
  - (a) Measure each of the new angles. How do the sizes compare?
  - (b) Write this instruction in your own words: "Bisect an angle."



2. Draw and bisect (a) two acute angles, (b) two obtuse angles.
3. Draw any large triangle.
  - (a) Bisect each angle.
  - (b) Extend the bisectors so that they intersect.
  - (c) Write a statement about the intersection point.

# Bisecting an Angle

We can use compasses to bisect an angle.



Start

Place the point of compasses on vertex  $A$  and draw arc to cut arms at  $R$  and  $T$ .

Place the point of compasses on  $R$  and draw an arc between rays.

Place the point of compasses on  $T$  and draw arc to cut first arc at  $P$ .

Draw  $AP$ .

Stop

Line  $AP$  bisects  $\angle BAC$ .

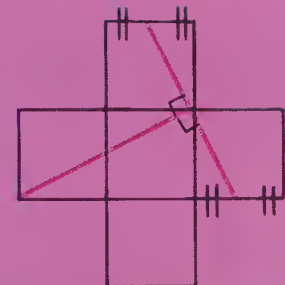
Use a plastic mirror to check.

## Exercises

1. Draw any angle  $DAN$ .  
Bisect it.  
Check, using a protractor.
2. Draw a triangle.
  - (a) Bisect each angle.
  - (b) Extend the bisectors so that they intersect.
  - (c) Write a statement about the intersection point.

## BRAINTICKLER

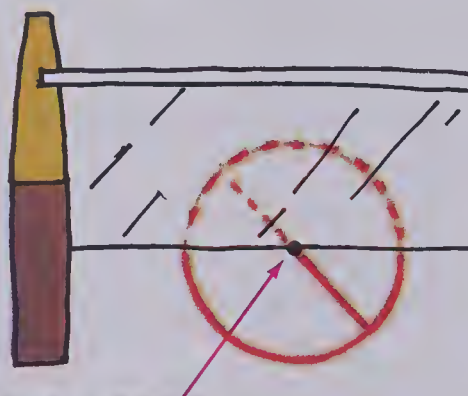
Make this pattern by tracing a square 5 times. Cut out. Draw in the red lines. Cut on the red lines. Use the 4 pieces to make one square.





# Locating the Centre of a Circle

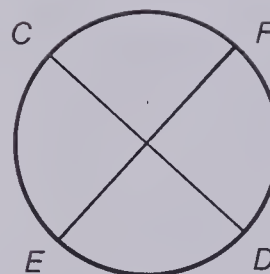
We can use the plastic mirror  
to locate the centre of a circle.  
Place the mirror on the circle  
so that one half matches the other half.  
Draw a line along the mirror.  
Repeat. Draw another line.  
The two lines intersect  
at the *centre of the circle*.



Centre of Circle

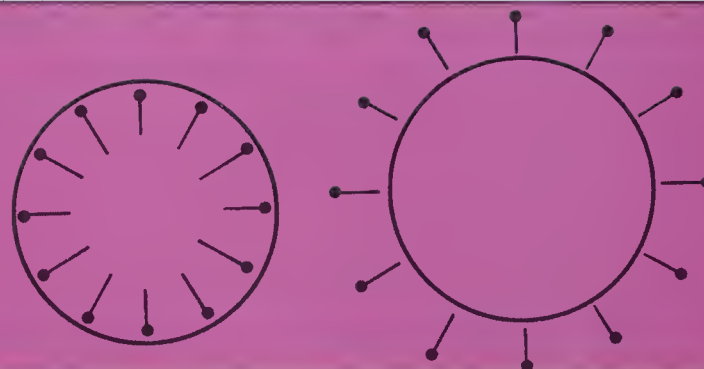
## Exercises

1. Use a round tin can to draw a circle.
  - (a) Locate the centre of the circle.  
Use compasses to check that you have located the centre.
  - (b) What is each segment  $CD$  and  $EF$  called?
2. Repeat Exercise 1 with two other circles.
3. Trace this arc.
  - (a) Find the centre of the circle of which it is part.
  - (b) Use compasses to complete the circle.



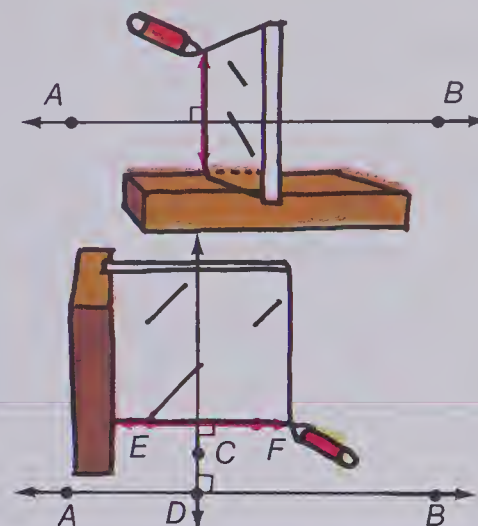
## BRAINTICKLER

Which circle is larger?  
Guess first. Then check.



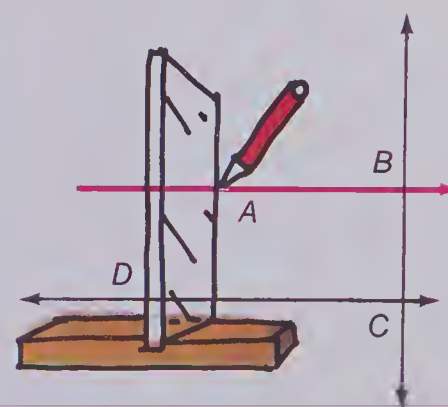
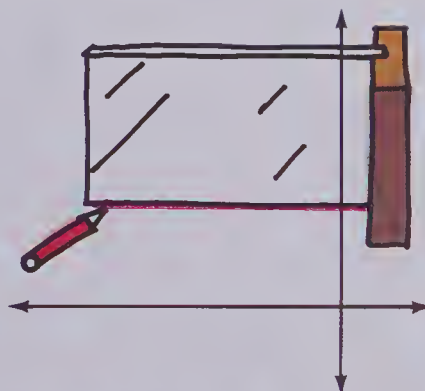
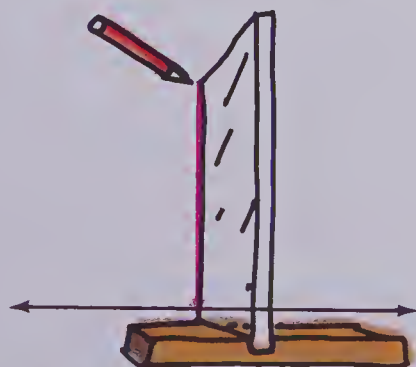
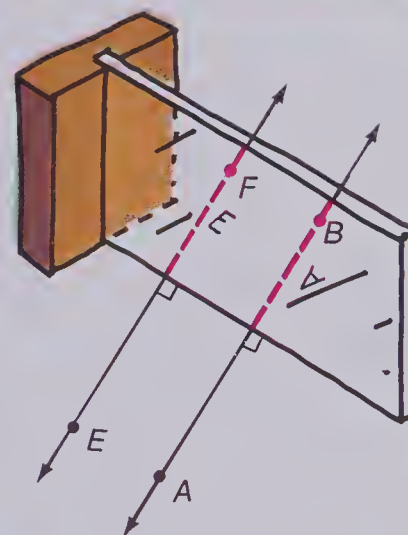
# Constructing Parallel Lines

We can draw a line parallel to another line by using a plastic mirror.  
 Draw a line  $DC$  perpendicular to  $AB$ .  
 Draw a line  $EF$  perpendicular to  $DC$ .  
 $EF$  is parallel to  $AB$ .



## Exercises

1. Draw a line  $AB$ .  
 Construct a line  $EF$  parallel to  $AB$ .  
 To check: Place your mirror across the two lines so  $AB$  fits on itself. Is  $EF$  on itself?  
 If it is, the two lines are parallel.
2. Draw a pair of parallel lines:  
 (a) 3 cm apart                      (b) 10 cm apart
3. Draw a rectangle using the method shown.

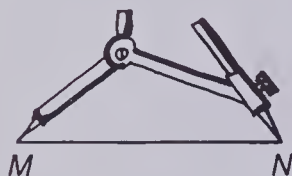


$ABCD$  is a rectangle. Why?

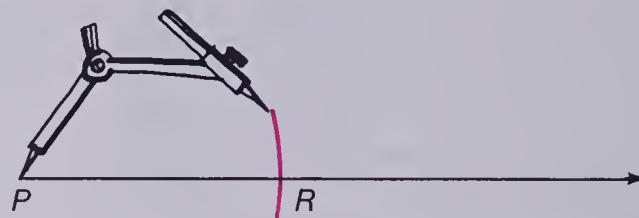
- ★ 4. Draw a square by using the method in Exercise 3.

# Copying a Line Segment

We can use compasses to make a line segment congruent to  $MN$ .



Set compasses to correct length.



Place the point on a new point  $P$  and draw an arc. Draw a line from  $P$  to arc. Label the intersection  $R$ .

$PR$  is congruent to  $MN$ .

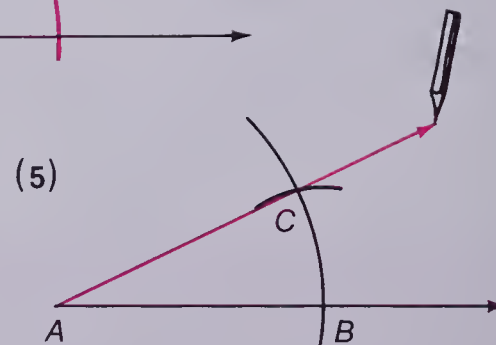
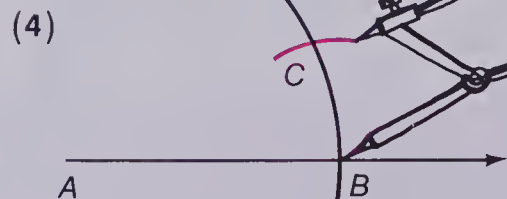
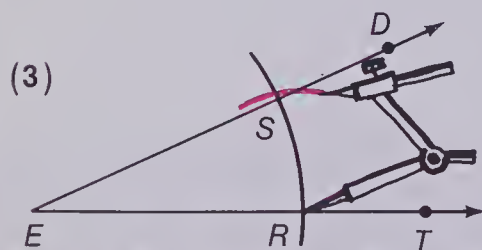
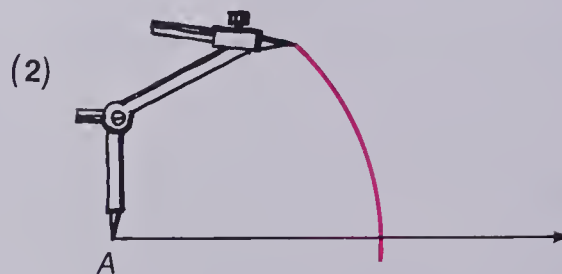
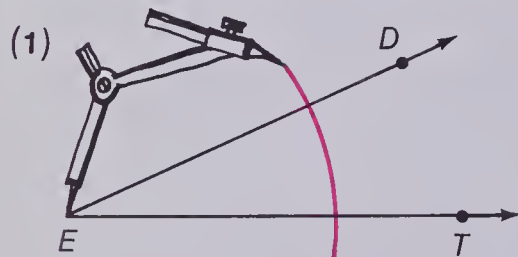
## Exercises

Draw a segment  $KJ$  on your page.

Construct another segment  $TS$  congruent to  $KJ$ .

# Copying an Angle

Follow the steps as we copy  $\angle DET$ .



$\angle CAB$  is a copy of  $\angle DET$ .

## Exercise

Draw any  $\angle DET$ . Use the method shown to copy it.



# Make a Puzzle

1. Draw a square  $ABCD$  10 cm on each side. Mark points  $E, F, G, H$  each 2 cm from a corner as shown.

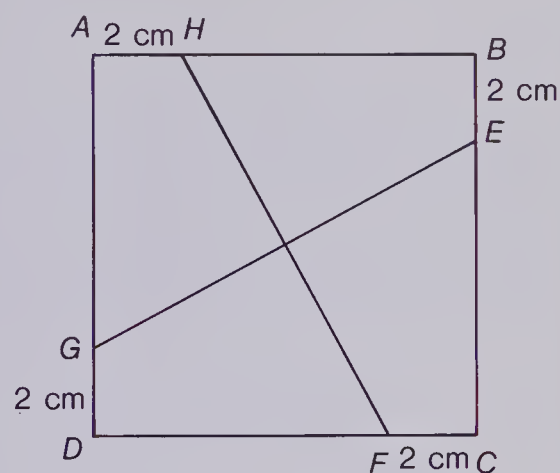
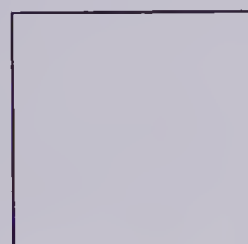
Draw segments  $HF$  and  $GE$ .

Cut along the lines to get 4 pieces.

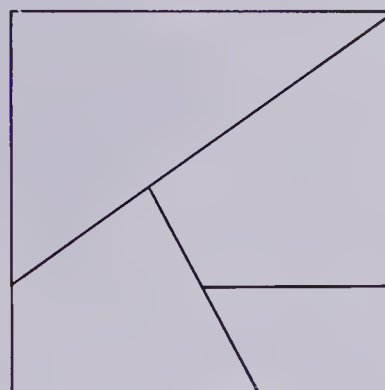
Draw and cut out a 6 cm square.

The challenge:

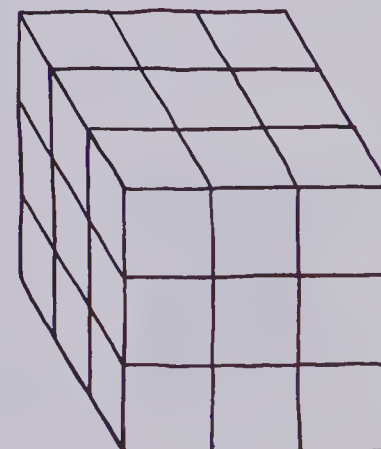
Combine the 5 pieces to form a large square.



2. Draw and cut out a 10 cm square. Cut it into any 4 pieces. Challenge a classmate to reassemble the pieces into a square.



3. Glue 27 cubes together. (Use as little glue as possible.) Paint the outside of the new large cube.
  - (a) How many small cubes have only 1 face painted?
  - (b) How many small cubes have exactly 2 faces painted?
  - (c) How many small cubes have exactly 3 faces painted?
  - (d) How many small cubes have exactly 4 faces painted?
  - (e) How many small cubes have no faces painted?



If necessary, take your cube apart to check.

# Making More 3D Shapes

## Activity

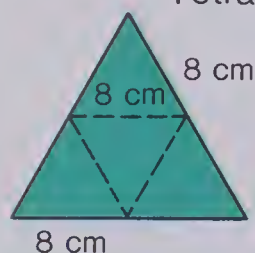
Construct each of the following nets for making polyhedra.

Use coloured paper or heavy tag.

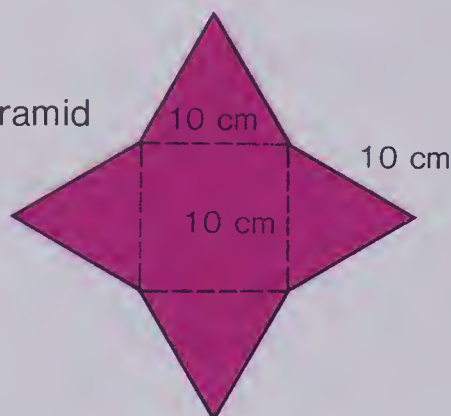
Cut out the nets and assemble them.

Label each with a name and suspend them in your classroom.

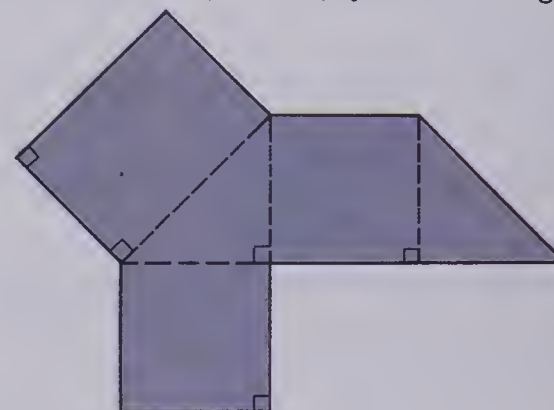
Tetrahedron



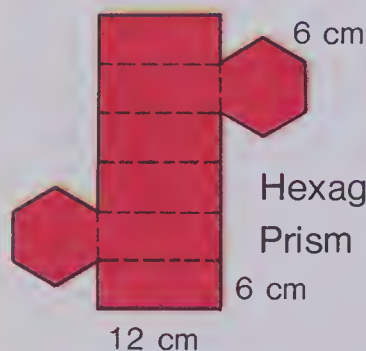
Pyramid



(Make up your own lengths.)

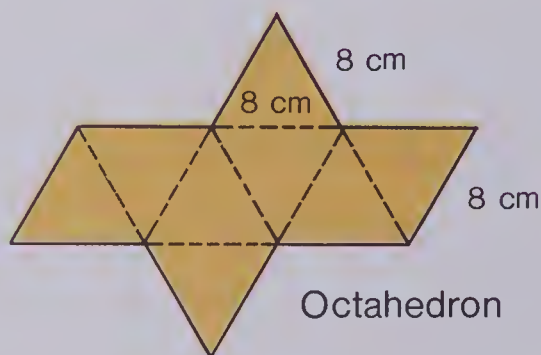


Triangular Prism

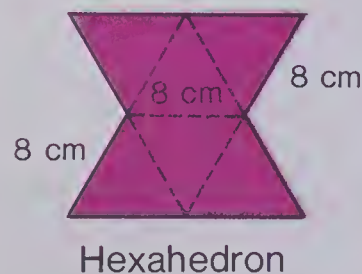


Hexagonal Prism

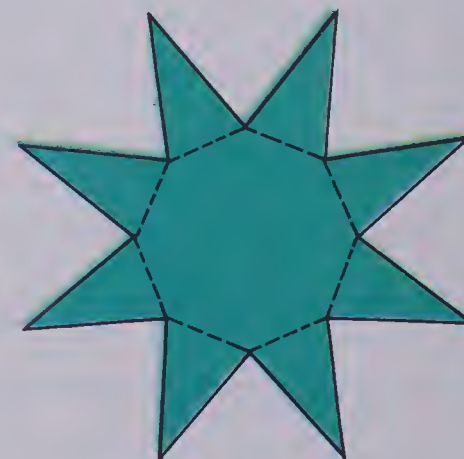
(Make up your own lengths.)



Octahedron



Hexahedron



Octagonal Pyramid

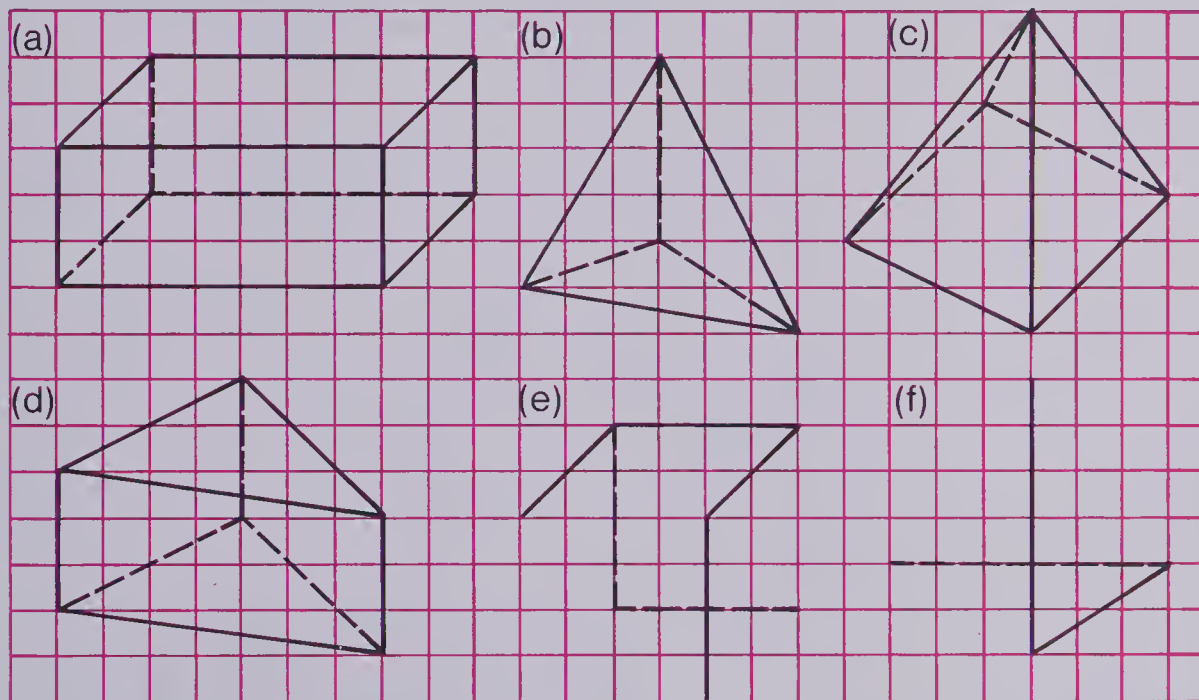
# Drawing Polyhedra

1. Copy and complete this chart for the 3D shapes you made from page 332.

Name of Polyhedra	Number of Vertices (V)	Number of Faces (F)	Number of Edges (E)	$V + F - E = \blacksquare$
tetrahedron	4	4	6	$4 + 4 - 6 = 2$
pyramid	5	$\blacksquare$	$\blacksquare$	$\blacksquare$
triangular prism	$\blacksquare$	5	$\blacksquare$	$\blacksquare$

What do you notice about the solution to  $V + F - E$ ?

2. Copy and name each polyhedron on graph paper. Complete parts (e) and (f).

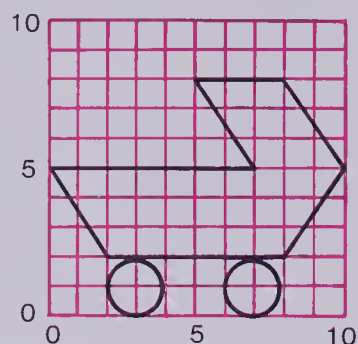


3. Use graph paper and draw your own polyhedra. Name each one.

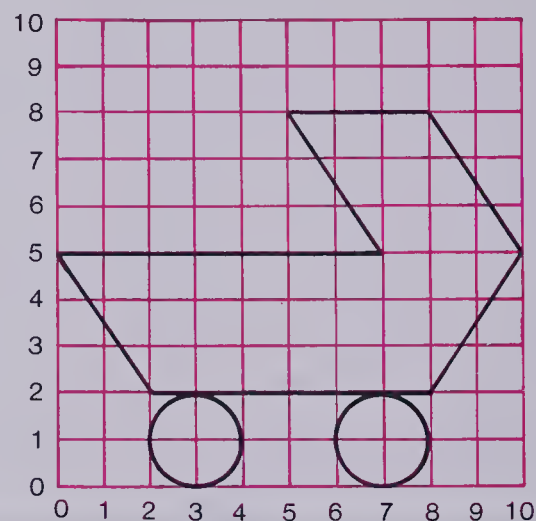


# Enlargements

Cathy wanted to draw this picture larger.



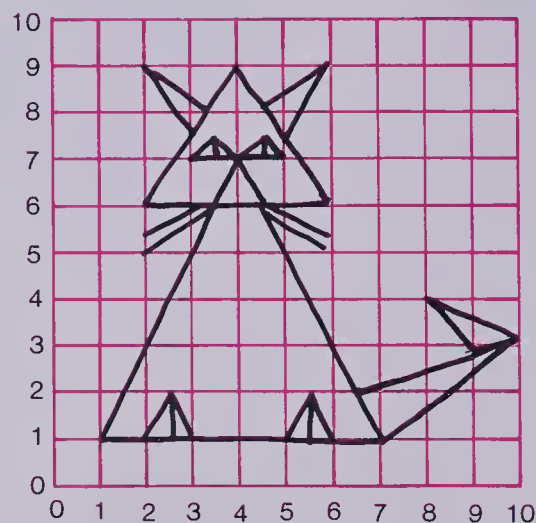
To do it, she used grid paper with larger squares.



## Exercises

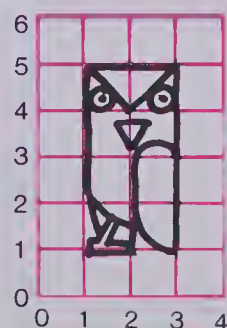
Use 1cm square grid paper.

- Copy the drawing of Triangle Cat.

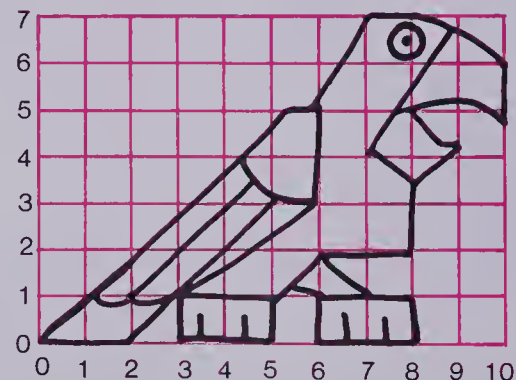


- Enlarge each bird, and then colour each one.

(a)

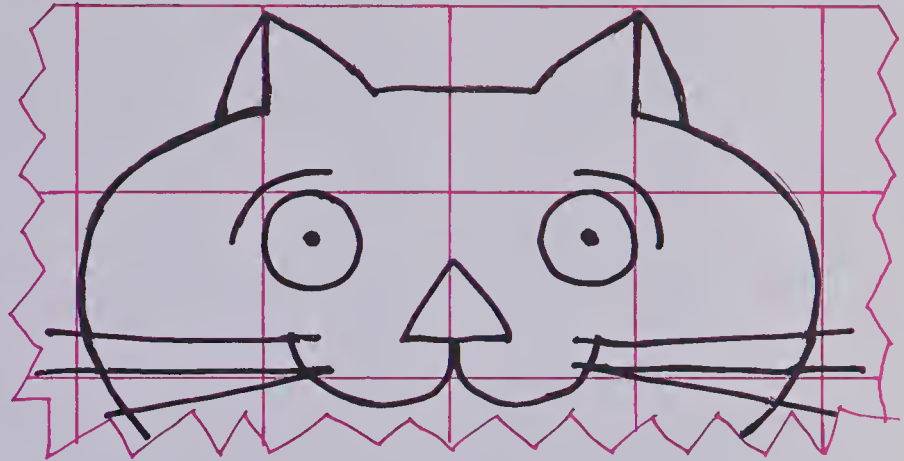
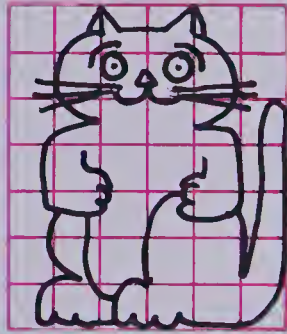


(b)



# Copying Cartoons

Janet is copying this cartoon figure.



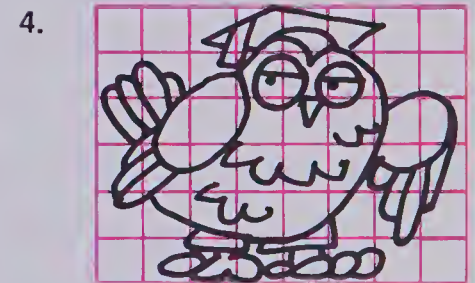
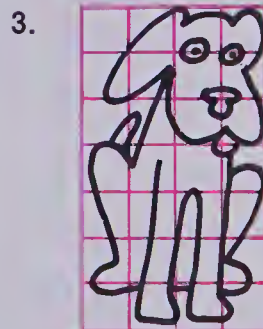
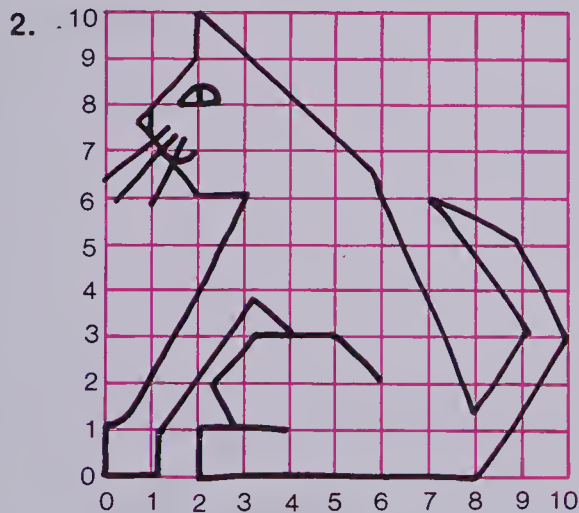
She is using grid paper with larger squares.

She copies each square carefully, and goes on to the next.

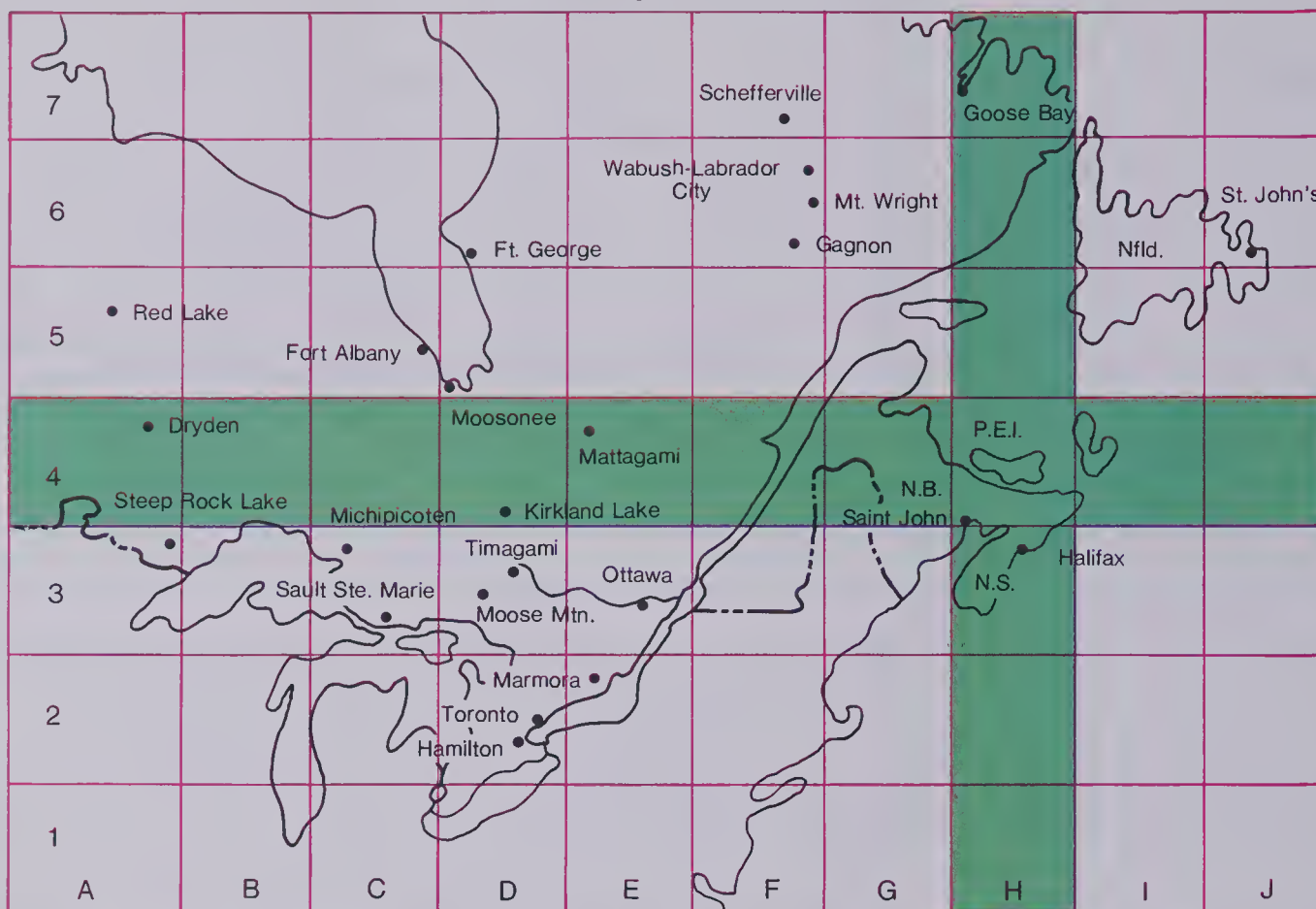
## Exercises

1. Use a grid with 2 cm squares.  
Copy the cartoon figure in the display.

Copy each cartoon figure.



# Using Maps



Nicholle and Gustolf were looking at this map. Gustolf asked, "Where is Saint John?"

Nicholle replied, "It is in square H4." Can you find Saint John?

## Exercises

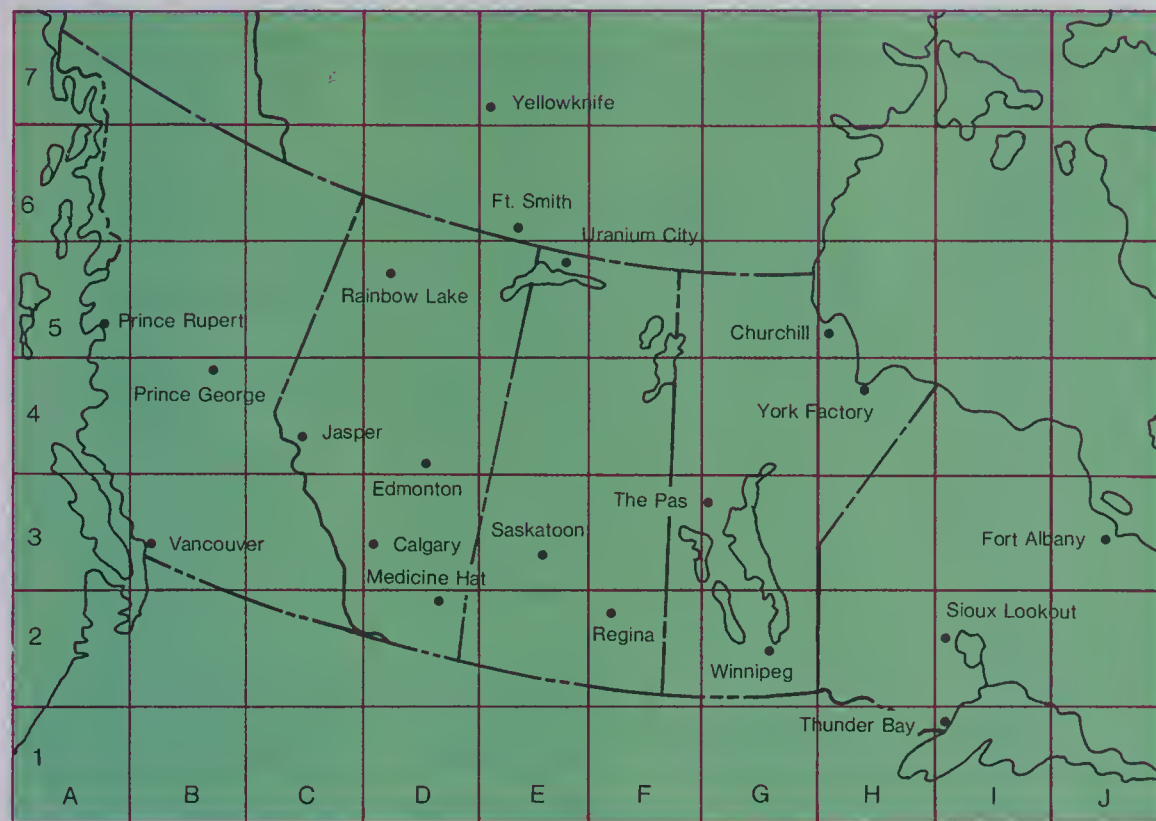
Refer to the map in the display.

1. Locate square D5. Name a city in this square.
2. Locate square F6. Name three cities in this square.

Locate each of the following places by using the name of the square.

3. Red Lake
4. Goose Bay
5. Mattagami
6. Kirkland Lake
7. Sault Ste. Marie
8. Halifax
9. Ottawa
10. Dryden
11. Hamilton
12. Ft. George
13. Locate the city in J6. In H4 there is a city with a similar name. How do the two names differ?





Name the city in each of these squares.

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 14. A5 | 15. E6 | 16. G3 | 17. J3 | 18. D5 |
| 19. E3 | 20. C4 | 21. E5 | 22. D2 | 23. I2 |

Give the name of the square in which each city is located.

- |               |              |                   |                 |
|---------------|--------------|-------------------|-----------------|
| 24. Vancouver | 25. Edmonton | 26. Prince George | 27. Calgary     |
| 28. Winnipeg  | 29. Regina   | 30. Saskatoon     | 31. Thunder Bay |

## Tune Up

Multiply.

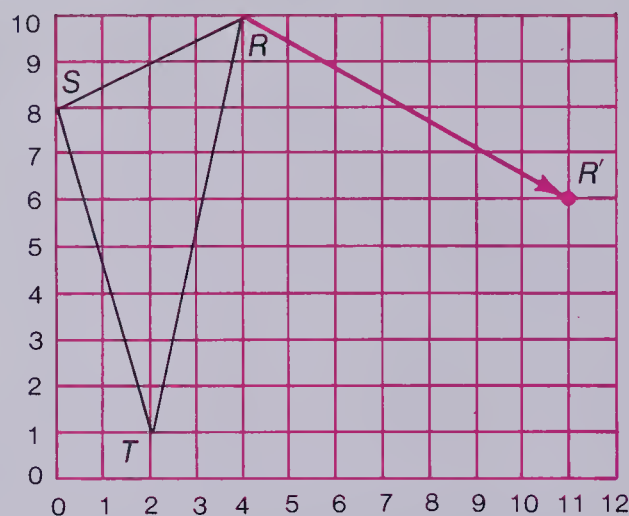
- |   |   |  |   |  |
|---|---|--|---|--|
| 1. $\begin{array}{r} 23.5 \\ \times 10 \\ \hline \end{array}$ | 2. $\begin{array}{r} 15.6 \\ \times 10 \\ \hline \end{array}$ | 3. $\begin{array}{r} 76.45 \\ \times 10 \\ \hline \end{array}$ | 4. $\begin{array}{r} 156.35 \\ \times 10 \\ \hline \end{array}$ | 5. $\begin{array}{r} 76.41 \\ \times 10 \\ \hline \end{array}$ |
|---|---|--|---|--|

Divide.

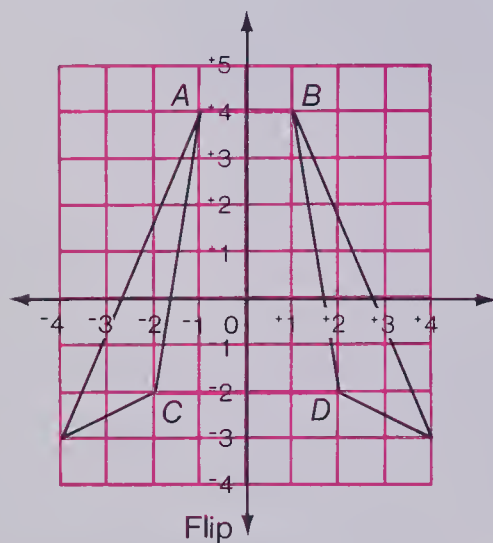
- |                   |                   |                    |                   |
|-------------------|-------------------|--------------------|-------------------|
| 6. $75.4 \div 10$ | 7. $46.5 \div 10$ | 8. $138.4 \div 10$ | 9. $13.1 \div 10$ |
|-------------------|-------------------|--------------------|-------------------|

# Chapter Test

- Copy this shape.  
Draw the slide image.

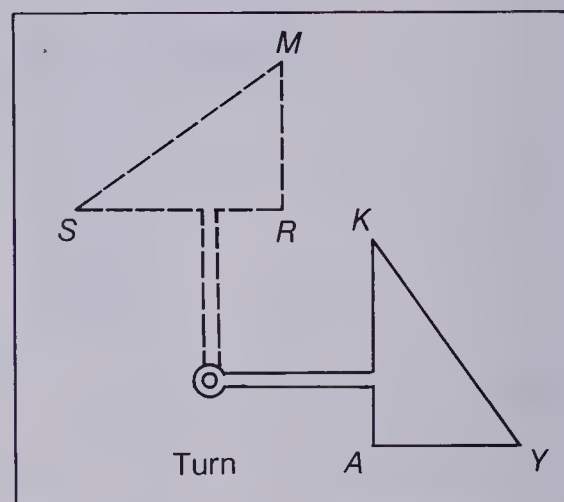


- Write what you know about lines  $AB$  and  $CD$ .

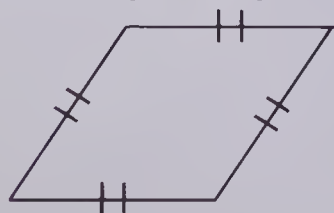


- Name the corresponding

- sides
- vertices



- Draw an angle.  
Bisect it.
- Draw a large rhombus  
as shown. Draw all the  
lines of symmetry.



- Draw a line segment.  
Construct its perpendicular bisector.
- Identify which shape or shapes have  
rotational symmetry.



# Cumulative Review

1. 2 407 000 000

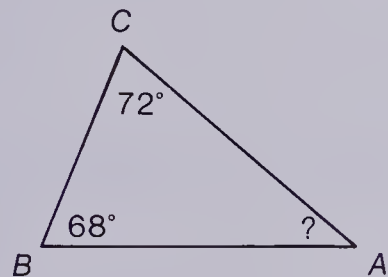
Complete: two          four          seven          .

2. The 7 in 2.347 is seven          .

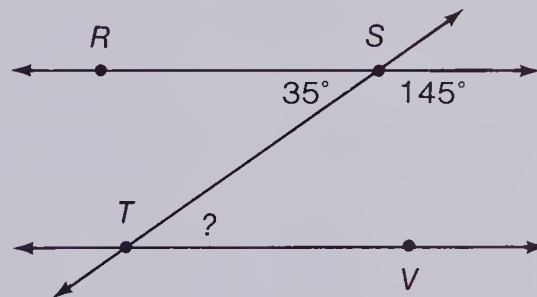
3.  $10^4 =$           .

4. Draw an angle. Use a protractor to measure it.

5. Calculate the measure of  $\angle A$ .



6. What is the measure of  $\angle STV$ ?



Multiply.

7. 
$$\begin{array}{r} 23.4 \\ \times 6.5 \\ \hline \end{array}$$

8. 
$$\begin{array}{r} 67.1 \\ \times 0.25 \\ \hline \end{array}$$

Divide.

9. 
$$23 \overline{)71.3}$$

10. 
$$5.6 \overline{)11.76}$$

11. What are the factors of 24?

12. Which of the following are prime?

13      16      41      58

Calculate.

13.  $24 \times \frac{1}{4}$

14.  $24 \div \frac{1}{4}$

15.  $\frac{1}{2} \times \frac{2}{3}$

16.  $\frac{7}{10} \div \frac{1}{2}$

17.  $\frac{3}{8} + \frac{1}{4}$

18.  $\frac{1}{4} + \frac{2}{3}$

19.  $\frac{9}{10} - \frac{2}{5}$

20.  $\frac{5}{6} - \frac{1}{4}$

21. 30% of 80

22. A car goes 80 km/h.

How far does it go in 5.5 h?



# Skills Check Up—Chapters 1 to 5

Give the correct answer for each: (a), (b), (c), or (d).

$$\begin{array}{r} 1. \quad 27 \\ 376 \\ 7529 \\ 828 \\ + 4501 \\ \hline \end{array}$$

- (a) 13 571  
(b) 13 271  
(c) 14 271  
(d) 13 261

$$\begin{array}{r} 2. \quad \$8463.47 \\ - 790.58 \\ \hline \end{array}$$

- (a) \$7772.89  
(b) \$8772.89  
(c) \$7672.89  
(d) \$7772.89

$$3. \quad 46.0 - 31.63$$

- (a) 14.37  
(b) 15.63  
(c) 77.63  
(d) 15.37

$$\begin{array}{r} 4. \quad 75.76 \\ \times 4.8 \\ \hline \end{array}$$

- (a) 363.648  
(b) 36.3648  
(c) 363.548  
(d) 373.648

$$5. \quad 34 \overline{)90702}$$

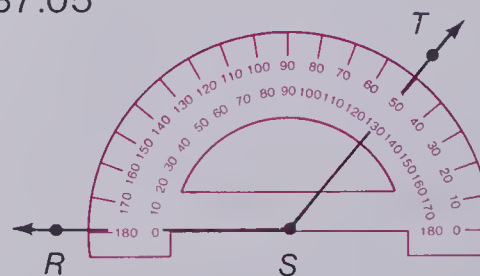
- (a) 2668 R 23  
(b) 2667 R 24  
(c) 2678 R 14  
(d) 2668 R 24

6. 637.047 rounded to the nearest hundredth is:

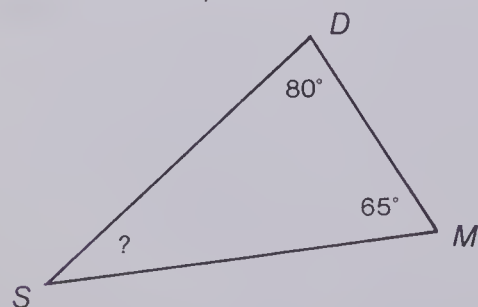
- (a) 600  
(b) 700  
(c) 637.1  
(d) 637.05

7. What is the measure of  $\angle RST$ ?

- (a)  $50^\circ$   
(b)  $80^\circ$   
(c)  $130^\circ$   
(d)  $180^\circ$



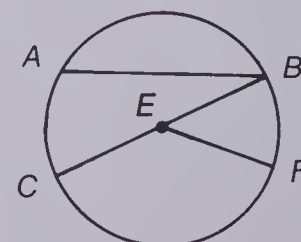
8. What is the measure of  $\angle S$ ?



- (a)  $35^\circ$   
(b)  $60^\circ$   
(c)  $25^\circ$   
(d)  $180^\circ$

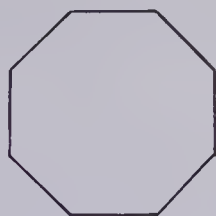
9. Line segment  $EF$  is:

- (a) a radius  
(b) a diameter  
(c) a chord  
(d) parallel



10. This polygon is:

- (a) a hexagon
- (b) a pentagon
- (c) an octagon
- (d) a heptagon



11.  $5.6 \overline{)224}$

- (a) 4
- (b) 40
- (c) 400
- (d) 0.4

12.  $\begin{array}{r} 635 \\ \times 0.001 \\ \hline \end{array}$

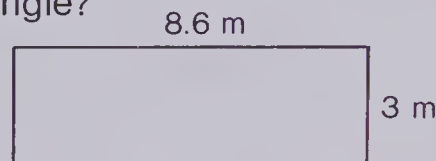
- (a) 0.0635
- (b) 0.635
- (c) 6.35
- (d) 63.5

13. Which equation correctly solves this problem?

Susan spends \$1.20/d for bus fare. How much does she spend in five days?

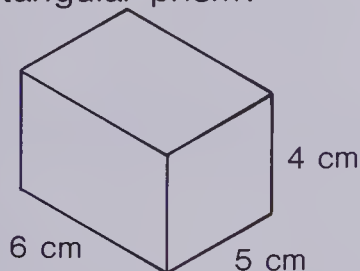
- (a)  $\$1.20 \times 5 = N$
- (b)  $\$1.20 + 5 = N$
- (c)  $5 - \$1.20 = N$
- (d)  $\$1.20 \div 5 = N$

14. What is the perimeter of this rectangle?



- (a)  $25.8 \text{ m}^2$
- (b) 11.6 m
- (c) 23.2 m
- (d)  $23.2 \text{ m}^2$

15. What is the volume of this rectangular prism?



- (a)  $120 \text{ cm}^3$
- (b)  $15 \text{ cm}^3$
- (c)  $34 \text{ cm}^3$
- (d)  $26 \text{ cm}^3$

16.  $5000 \text{ g} = \blacksquare \text{ kg}$

- (a) 500
- (b) 50
- (c) 5
- (d) 0.5

17. One litre of water has a mass of 1 kg. What is the mass of 1000 mL of water?

- (a) 1000 kg
- (b) 100 kg
- (c) 10 kg
- (d) 1 kg

19. It was  $-11^\circ\text{C}$ .

The temperature rose  $12^\circ\text{C}$ .

What was the new temperature?

- (a)  $-23^\circ\text{C}$
- (b)  $23^\circ\text{C}$
- (c)  $-1^\circ\text{C}$
- (d)  $1^\circ\text{C}$

18.  $8 \overline{)5}$

- (a) 0
- (b) 0.62
- (c) 0.625
- (d) 1.6

20. How much time is there between 08:27 and 14:45?

- (a) 6 h
- (b) 6 h 18 min
- (c) 6h 45 min
- (d) 6h 27 min

# Skills Check Up—Chapters 6 to 11

Give the correct answer for each: (a), (b), (c), or (d).

1. Which of these are prime numbers?

2, 4, 6, 8

(a) 2      (b) 4      (c) 6      (d) 8

2. The greatest composite number that is less than 20 is:

(a) 19      (b) 18      (c) 17      (d) 16

3. Which of these numbers is divisible by 5?

(a) 104      (b) 105  
(c) 106      (d) 107

4. The greatest common factor of 10 and 30 is:

(a) 1      (b) 5      (c) 6      (d) 10

5.  $4 \times 10^3 = \blacksquare$

(a) 40      (b) 400  
(c) 4000      (d) 640 000

6.  $5^3 = \blacksquare$

(a) 25      (b) 125  
(c) 15      (d) 8

7. An equivalent fraction for  $\frac{3}{5}$  is:

(a)  $\frac{8}{5}$       (b)  $\frac{6}{15}$       (c)  $\frac{9}{25}$       (d)  $\frac{18}{30}$

8. Which of the following fractions is greater than  $\frac{3}{4}$ ?

(a)  $\frac{6}{8}$       (b)  $\frac{2}{3}$       (c)  $\frac{15}{24}$       (d)  $\frac{5}{6}$

9.  $6\frac{1}{8}$       (a)  $2\frac{7}{8}$       (b)  $3\frac{1}{8}$   
 $-3\frac{1}{4}$       (c)  $3\frac{3}{8}$       (d)  $9\frac{3}{8}$

10.  $\frac{3}{8} \div \frac{3}{4}$

(a)  $\frac{9}{16}$       (b)  $\frac{9}{24}$       (c)  $\frac{1}{2}$       (d)  $\frac{2}{3}$

11.  $\frac{3}{7}$  of 28

(a) 7      (b) 12      (c) 10      (d) 8

12.  $\frac{4}{5} = \blacksquare$

(a) 0.5      (b) 0.4      (c) 0.8      (d) 8.0

13.  $\frac{7}{20} = \blacksquare$       (a) 7%      (b) 20%      (c) 12%      (d) 35%



14. 9% as a decimal is:

- (a) 9.0                      (b) 0.9  
(c) 0.09                    (d) 90

15. 4% of \$150

- (a) \$600                    (b) \$6  
(c) \$60                     (d) 600%

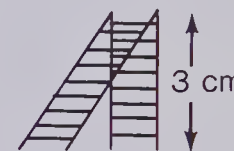
16. What is the average of:

13, 40, 42, 5, 20, 18?

- (a) 23                      (b) 32  
(c) 42                      (d) 21

17. Use the scale 1:60.

What is the actual height of this ladder?



- (a) 20 cm    (b) 18 cm  
(c) 180 cm   (d) 57 cm

18. How much interest would be received on a \$500-deposit that earns 12% interest each year?

- (a) \$12                      (b) \$30  
(c) \$60                      (d) \$560

19. Linda bought a 10-speed bike for \$150. What was the final cost of the bike with a provincial sales tax rate of 7%?

- (a) \$157                      (b) \$160  
(c) \$160.50                  (d) \$139.50

20. Dave bought a bowl of soup for \$0.80, 2 sandwiches for \$0.65 each and a glass of milk for \$0.45.

How much change should he get from a \$5-bill?

- (a) \$2.55                      (b) \$2.45  
(c) \$4.10                      (d) \$3.45

21. At an average speed of 14 km/h, how far could John cycle in 1.5 h?

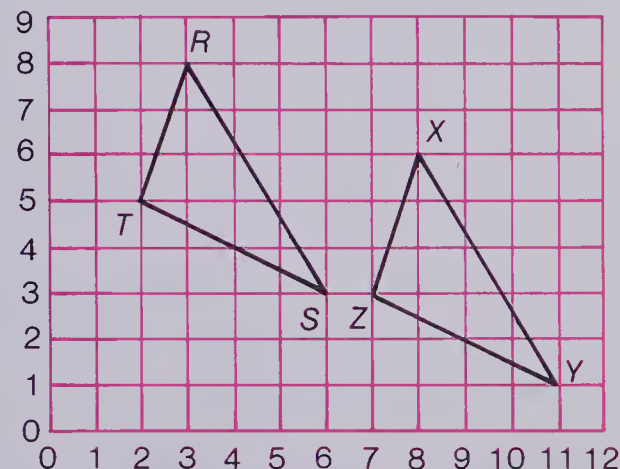
- (a) 7 km                      (b) 14 km  
(c) 21 km                      (d) 15.5 km

22. On the graph at the right, triangles *RST* and *XYZ* are related by a slide. Which vertex on *RST* matches vertex *Z*?

- (a) *Z*    (b) *R*    (c) *S*    (d) *T*

23. Which ordered pair names vertex *R*?

- (a) (3, 8)                      (b) (8, 3)  
(c) (8, 6)                      (d) (3, 7)



# Extra Practice—Chapter One

Calculate.

1. (a) 
$$\begin{array}{r} 8350 \\ 4259 \\ 7158 \\ + 2054 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 8563 \\ 285 \\ 4037 \\ + 74 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} \$583.82 \\ 498.05 \\ 38.19 \\ 717.36 \\ + 300.98 \\ \hline \end{array}$$

(d)  $483 + 768 + 853$

(e)  $\$7653.82 + \$684.76$

2. (a) 
$$\begin{array}{r} 469 \\ - 378 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 5716 \\ - 4839 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} \$364.48 \\ - 87.39 \\ \hline \end{array}$$

(d)  $6000 - 4876$

(e)  $\$8534.38 - \$5032.51$

3. (a) 
$$\begin{array}{r} 48.57 \\ 9.35 \\ + 4.83 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 371.494 \\ 63.053 \\ + 156.04 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 5.852 \\ 3.950 \\ + 6.446 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 30.4831 \\ 12.7685 \\ 5.3286 \\ + 86.4768 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 9.487 \\ 3.0174 \\ 8.15 \\ + 3.0009 \\ \hline \end{array}$$

4. (a) 
$$\begin{array}{r} 8.4 \\ - 3.57 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 185.6 \\ - 84.93 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 63.49 \\ - 8.476 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 8563.7 \\ - 946.85 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 476.03 \\ - 38.5 \\ \hline \end{array}$$

5. Write each number in words.

(a) 6 483 562

(b) 8 400 357

(c) 81 305 768

(d) 753 000 500

6. Use  $=$  or  $\neq$  to make each number sentence true.

(a)  $3+3+3 \bullet 7$

(b)  $438-78 \bullet 360$

(c)  $36+49 \bullet 49+36$

(d)  $83-69 \bullet 24$

7. Copy and complete, using  $>$  or  $<$ .

(a)  $38 \bullet 3.8$

(b)  $96 \bullet 12+9$

(c)  $83 \bullet 83.74$

(d)  $15-9 \bullet 7$

# Extra Practice—Chapter One

1. Write the value of each underlined digit.

1-2

- (a) 3201      (b) 607      (c) 4329.1      (d) 744 622      (e) 6.113

Calculate.

2. (a) 
$$\begin{array}{r} 3.112 \\ 0.218 \\ + 5.663 \\ \hline \end{array}$$
      (b) 
$$\begin{array}{r} 422.31 \\ 57.016 \\ + 313.9 \\ \hline \end{array}$$
      (c) 
$$\begin{array}{r} \$219.53 \\ 6.85 \\ + 2.99 \\ \hline \end{array}$$
      (d)  $7.8 + 0.811$       (e)  $1.11 + 0.8 + 7.445$

7

3. (a) 
$$\begin{array}{r} 45.941 \\ - 26.541 \\ \hline \end{array}$$
      (b) 
$$\begin{array}{r} \$68.50 \\ - 33.99 \\ \hline \end{array}$$
      (c) 
$$\begin{array}{r} 0.847 \\ - 0.608 \\ \hline \end{array}$$
      (d)  $0.9 - 0.052$       (e)  $47.8 - 19.93$

8

Round each number to the nearest value shown in brackets.

12

4. (a) 3540 (hundred)      (b) 78 (ten)      (c) 8612 (thousand)  
(d) 442 881 (hundred thousand)      (e) 819 438 (ten thousand)
5. (a) 72.546 (tenth)      (b) 9.117 (hundredth)      (c) 196.499 (whole number)  
(d) 0.599 (whole number)      (e) 321.666 (hundredth)

13

6. Solve these equations.

19

- (a)  $n + 9 = 17$       (b)  $n - \$12.75 = \$33.50$       (c)  $56 + n = 100$   
(d)  $n - 28.5 = 63.8$       (e)  $n + 4.113 = 6.8$

7. Arrange these numbers in order from smallest to largest.

26

- (a) 91.9, 2.28, 615, 22.8, 15.15  
(b) 45 637, 456.37, 45 637.1, 0.456 37, 45. 637 1

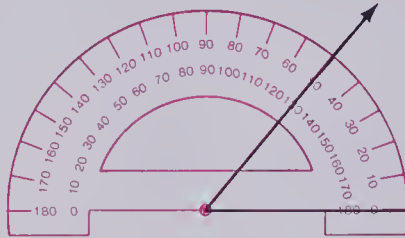


# Extra Practice — Chapter Two

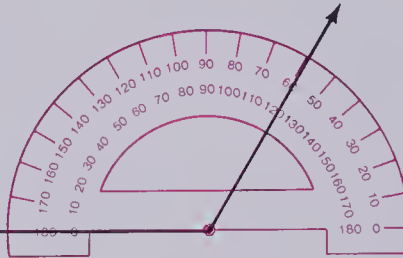
What is the measure of each angle?

35

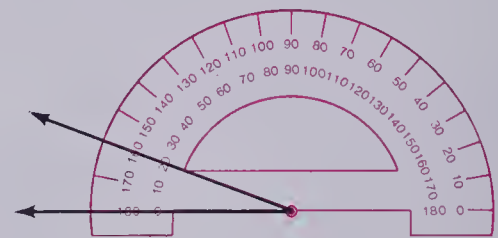
1.



2.



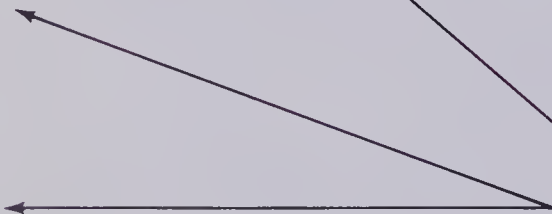
3.



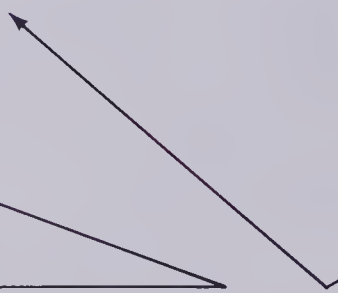
Use a protractor to measure each angle.

35

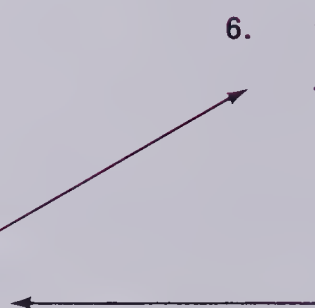
4.



5.



6.



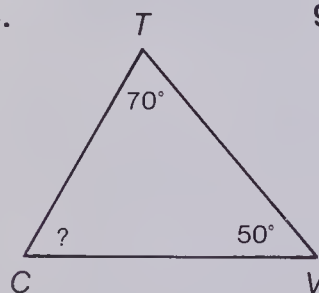
7.



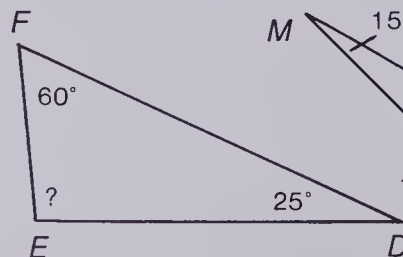
Calculate the measure of the third angle in each triangle.

43

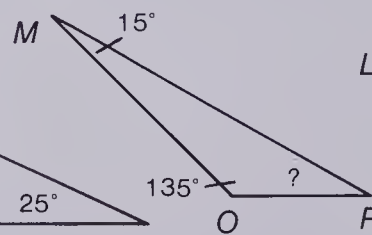
8.



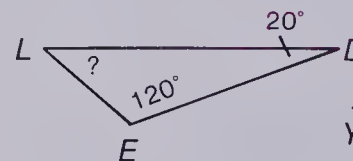
9.



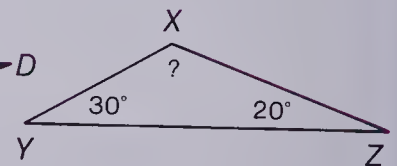
10.



11.



12.



Write an equation for each problem and solve.

53

13. Six forestry workers cut 132 logs in one day. On the average, how many logs did each cut?

14. There are 36 more firefighters than there are trucks. There are 12 trucks. How many firefighters are there?

# Extra Practice—Chapter Two

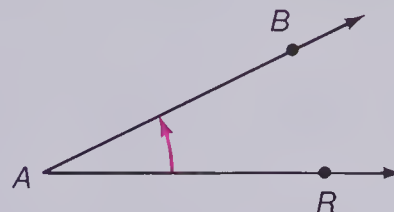
1. How long is the diameter?

29



2. Name the angle three ways.

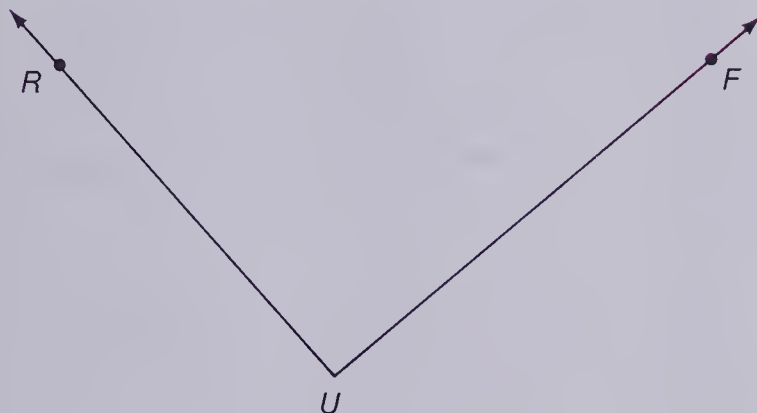
30



3. Use a protractor.

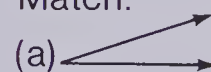
35

What is the measure of  $\angle RUF$ ?



4. Match.

37



1. Straight angle



2. Obtuse angle



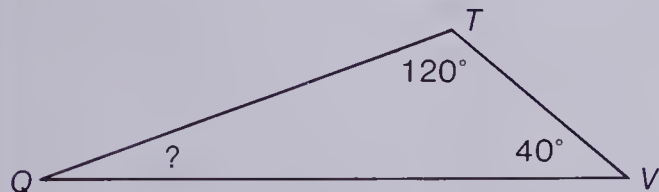
3. Right angle



4. Acute angle

5. Calculate the measure of  $\angle Q$ .

42



6. Draw.

44

(a) a pair of parallel lines

(b) a pair of intersecting lines

(c) a pair of perpendicular lines

(d) a circle with a radius 3 cm

7. Match.

46

(a) Quadrilateral



(b) Hexagon



(c) Octagon

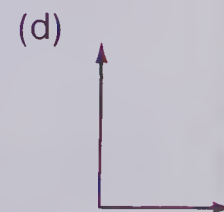
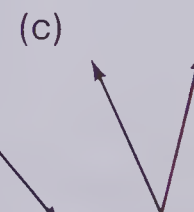
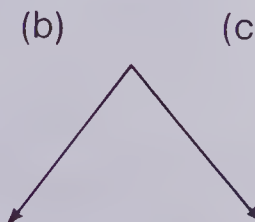


(d) Pentagon



8. Identify the congruent angles.

31, 36



# Extra Practice—Chapter Three

Calculate.

1. (a) 
$$\begin{array}{r} 38 \\ \times 28 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 70 \\ \times 36 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 57 \\ \times 14 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 39 \\ \times 54 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 68 \\ \times 71 \\ \hline \end{array}$$

64

2. (a) 
$$\begin{array}{r} 946 \\ \times 85 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 800 \\ \times 46 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 734 \\ \times 50 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} \$4.39 \\ \times 86 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} \$5.26 \\ \times 14 \\ \hline \end{array}$$

65

3. (a) 
$$\begin{array}{r} 543 \\ \times 482 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 985 \\ \times 217 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 646 \\ \times 702 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} \$9.83 \\ \times 197 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} \$6.49 \\ \times 583 \\ \hline \end{array}$$

66

4. (a) 
$$\begin{array}{r} 8432 \\ \times 100 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 9176 \\ \times 100 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 25 \\ \times 1000 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 768 \\ \times 1000 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 4105 \\ \times 1000 \\ \hline \end{array}$$

61

5. (a) 
$$\begin{array}{r} 48.81 \\ \times 7 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} \$30.53 \\ \times 9 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 976.97 \\ \times 8 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 487.65 \\ \times 4 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 999.99 \\ \times 5 \\ \hline \end{array}$$

69

6. (a) 
$$\begin{array}{r} 347 \\ \times 0.8 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 482 \\ \times 0.3 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 7642 \\ \times 0.4 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 15\,476 \\ \times 0.7 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 36\,401 \\ \times 0.6 \\ \hline \end{array}$$

71

7. (a) 
$$\begin{array}{r} 58 \\ \times 1.52 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 59 \\ \times 8.35 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 865 \\ \times \$9.42 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 1834 \\ \times 2.08 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 5819 \\ \times 6.19 \\ \hline \end{array}$$

74

8. (a) 
$$\begin{array}{r} 5.3 \\ \times 3.6 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 8.5 \\ \times 9.4 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 50.6 \\ \times 5.3 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 468.7 \\ \times 3.9 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 309.4 \\ \times 6.7 \\ \hline \end{array}$$

76

9. (a) 
$$\begin{array}{r} 39.6 \\ \times 3.48 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 83.4 \\ \times 6.59 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 44.37 \\ \times 3.41 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 18.76 \\ \times 5.38 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 8.37 \\ \times 20.6 \\ \hline \end{array}$$

77

10. (a) 
$$\begin{array}{r} 4859 \\ \times 706 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 8005 \\ \times 4007 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 9413 \\ \times 5037 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 68\,342 \\ \times 7\,012 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 98\,603 \\ \times 4\,318 \\ \hline \end{array}$$

87



# Extra Practice—Chapter Three

Calculate.

1. (a) 
$$\begin{array}{r} 412 \\ \times 1 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 613 \\ \times 10 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 589 \\ \times 1 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 66 \\ \times 10 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 876 \\ \times 1 \\ \hline \end{array}$$

60

2. (a) 
$$\begin{array}{r} 29 \\ \times 100 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 149 \\ \times 100 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 99 \\ \times 1000 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 493 \\ \times 10 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 6000 \\ \times 1000 \\ \hline \end{array}$$

61

3. (a) 
$$\begin{array}{r} 66 \\ \times 34 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 48 \\ \times 18 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 59 \\ \times 31 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 28 \\ \times 37 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 75 \\ \times 25 \\ \hline \end{array}$$

64

4. (a) 
$$\begin{array}{r} 127 \\ \times 346 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 622 \\ \times 446 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 587 \\ \times 630 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 449 \\ \times 419 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 128 \\ \times 372 \\ \hline \end{array}$$

66

5. (a) 
$$\begin{array}{r} 391 \\ \times 105 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 442 \\ \times 303 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 626 \\ \times 603 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 499 \\ \times 509 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 906 \\ \times 500 \\ \hline \end{array}$$

67

6. (a) 
$$\begin{array}{r} \$33.50 \\ \times 4 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} \$61.95 \\ \times 5 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} \$66.88 \\ \times 3 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} \$0.29 \\ \times 7 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} \$55.25 \\ \times 9 \\ \hline \end{array}$$

69

7. (a) 
$$\begin{array}{r} 821 \\ \times 0.6 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 488 \\ \times 0.4 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 329 \\ \times 0.5 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 3645 \\ \times 0.8 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 22\,027 \\ \times 0.7 \\ \hline \end{array}$$

71

8. (a) 
$$\begin{array}{r} 60.2 \\ \times 4.132 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 78.042 \\ \times 7.08 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 1.4132 \\ \times 0.03 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 9.17 \\ \times 2.3004 \\ \hline \end{array}$$

(e) 
$$\begin{array}{r} 3.819 \\ \times 22.2 \\ \hline \end{array}$$

78

Write an equation for each problem, and solve.

9. Jan bought 2 record albums. Each album was \$8.98. How much did she spend?

10. Derrick delivers 46 papers each day. How many does he deliver in six days?

86

# Extra Practice — Chapter Four

Calculate.

1. (a)  $10 \overline{)870}$  (b)  $100 \overline{)2400}$  (c)  $1000 \overline{)36\,000}$  (d)  $1000 \overline{)521\,000}$  95

2. (a)  $8 \overline{)272}$  (b)  $9 \overline{)1926}$  (c)  $4 \overline{)2372}$  (d)  $5 \overline{)33\,705}$  97

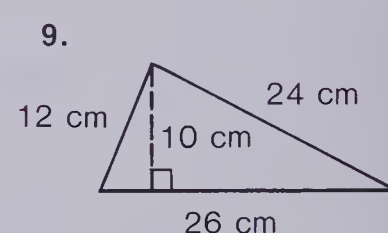
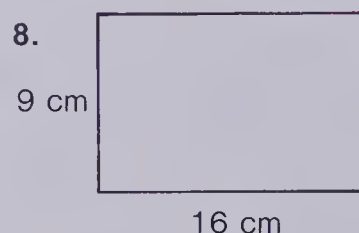
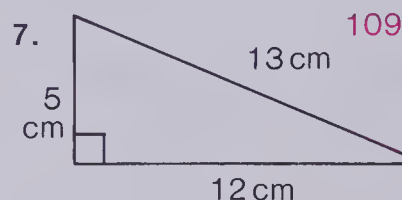
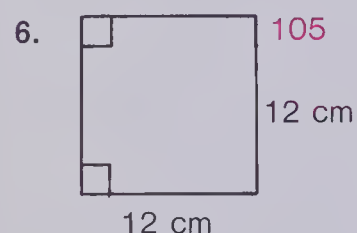
3. (a)  $56 \overline{)95\,437}$  (b)  $27 \overline{)76\,357}$  (c)  $85 \overline{)64\,768}$  (d)  $93 \overline{)54\,376}$  100

4. (a)  $7 \overline{)436.45}$  (b)  $3 \overline{)118.41}$  (c)  $6 \overline{)492.96}$  (d)  $9 \overline{)621.18}$  103

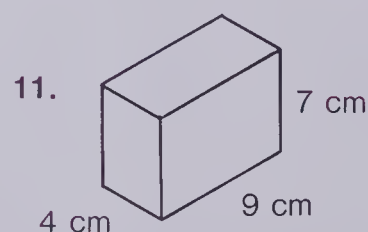
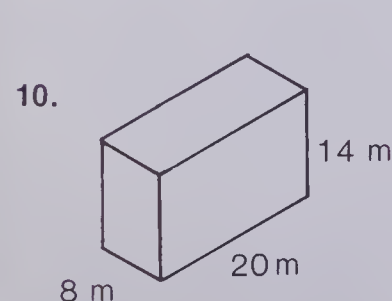
5. Copy and complete. 104

- |                             |                  |                   |
|-----------------------------|------------------|-------------------|
| (a) 5 cm = ■ mm             | (b) 8 km = ■ m   | (c) 3 km = ■ m    |
| (d) 25 cm = ■ mm            | (e) 60 cm = ■ m  | (f) 1250 km = ■ m |
| (g) 750 mm = ■ cm           | (h) 900 m = ■ km | (i) 1000 mm = ■ m |
| (j) 2 L = ■ cm <sup>3</sup> | (k) 1 t = ■ kg   | (l) 1 kL = ■ L    |

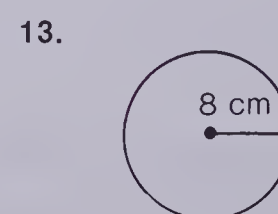
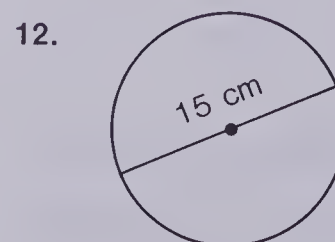
Calculate the perimeter and area of each.



Calculate the volume.



Calculate the circumference. Use  $\pi = 3.14$ . 107



# Extra Practice — Chapter Four

Calculate.

1. (a)  $90 \div 10$  (b)  $\$2600 \div 100$  (c)  $4400 \div 100$  (d)  $860\ 000 \div 1000$  95
2. (a)  $6 \overline{)1296}$  (b)  $8 \overline{)4342}$  (c)  $5 \overline{)2649}$  (d)  $7 \overline{)83\ 245}$  97
3. (a)  $34 \overline{)238}$  (b)  $52 \overline{)1404}$  98 (c)  $93 \overline{)3908}$  (d)  $39 \overline{)16\ 088}$  100
4. (a)  $81.6 \div 48$  102 (b)  $\$280.32 \div 6$  (c)  $56.52 \div 18$  (d)  $\$170.72 \div 44$  103

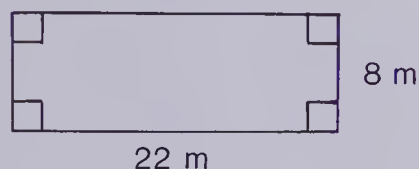
5. Copy and complete.

104

- (a)  $2000\text{ mm} = \blacksquare\text{ m}$  (b)  $500\text{ cm} = \blacksquare\text{ m}$  (c)  $2.5\text{ km} = \blacksquare\text{ m}$   
 (d)  $4\text{ hm} = \blacksquare\text{ m}$  (e)  $2000\text{ kg} = \blacksquare\text{ t}$  (f)  $5000\text{ L} = \blacksquare\text{ kL}$   
 (g)  $1\text{ km} + 2\text{ hm} + 1\text{ dam} + 4\text{ m} = \blacksquare\text{ m}$  (h)  $5\text{ m} + 3\text{ dm} + 6\text{ cm} + 4\text{ mm} = \blacksquare\text{ m}$

6. Calculate the perimeter.

105

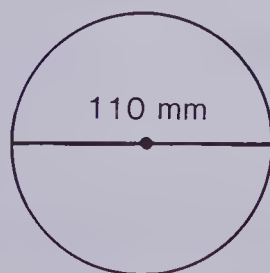


7. Calculate the area of the rectangle in Exercise 6.

108

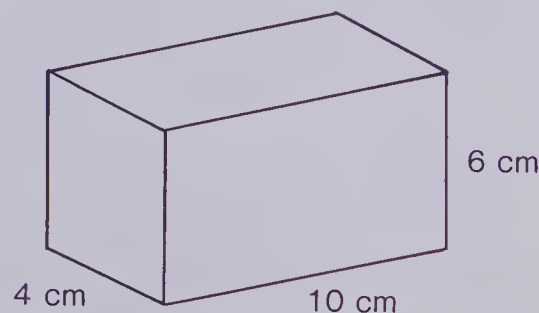
8. Calculate the circumference of the circle. (Use  $\pi = 3.14$ .)

107



9. Calculate the volume.

116





# Extra Practice—Chapter Five

Calculate.

1. (a)  $43 \div 0.01$  (b)  $509 \div 0.1$  (c)  $617 \div 0.01$  (d)  $3450 \div 0.1$  128, 133

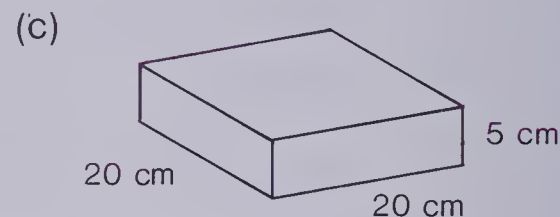
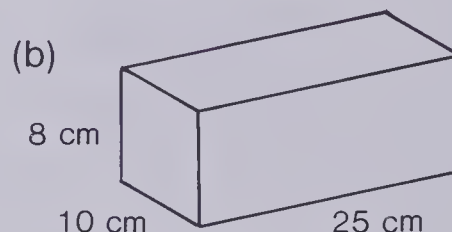
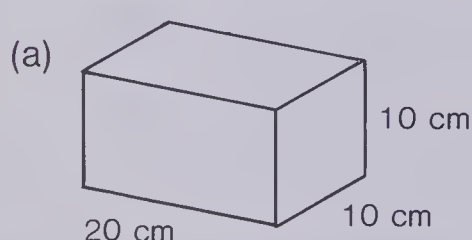
2. (a)  $0.6 \overline{)438}$  (b)  $0.7 \overline{)623}$  129 (c)  $5.6 \overline{)336}$  (d)  $8.3 \overline{)3569}$  130

3. (a)  $2.6 \overline{)21.32}$  (b)  $4.7 \overline{)25.38}$  132 (c)  $0.01 \overline{)28.675}$  (d)  $0.01 \overline{)0.461}$  133

4. (a)  $0.001 \overline{)13.56}$  135 (b)  $4.2 \overline{)1.47}$  132 (c)  $6.5 \overline{)33.423}$  140 (d)  $64 \overline{)16}$  141

5. 1 L of water has a mass of 1 kg. 144

What is the mass of water that fills each carton?



6. An airplane left Vancouver at 06:00 for a direct flight to Toronto. It arrived in Toronto at 14:00. How long was the flying time? 151

7. A radio announcer in Winnipeg announces the time as “three thirty-two.” What would be the correct time for a listener in Prince Rupert? 151

Draw a picture for each problem. Solve. 153

8. Fee-Fie, the giant, is 273 cm tall.  
Tom Thumb, the midget, is 87 cm tall.  
How much taller is Fee-Fie than Tom Thumb?

9. A circular race track is 1.6 km long.  
How far does a racing car go in 3 trips around the track?

10. How much time from A to B?

A	03:15	02:30	09:40	23:10	23:45	21:11	14:14
B	07:45	05:10	14:10	00:10	01:15	02:23	07:07

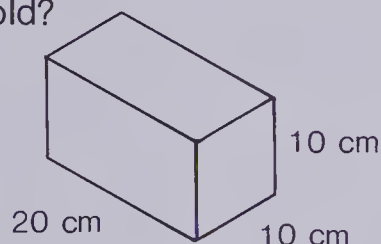
146

# Extra Practice — Chapter Five

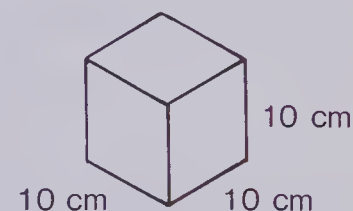
Divide.

- |                                  |                               |                              |                              |     |
|----------------------------------|-------------------------------|------------------------------|------------------------------|-----|
| 1. (a) $0.2 \overline{)76}$      | (b) $0.4 \overline{)276}$     | (c) $0.9 \overline{)252}$    | (d) $0.3 \overline{)2982}$   | 129 |
| 2. (a) $1.5 \overline{)510}$     | (b) $3.7 \overline{)2257}$    | (c) $6.2 \overline{)5766}$   | (d) $9.8 \overline{)8624}$   | 130 |
| 3. (a) $5.3 \overline{)34.45}$   | (b) $4.6 \overline{)30.82}$   | (c) $3.3 \overline{)19.14}$  | (d) $7.5 \overline{)60.75}$  | 132 |
| 4. (a) $0.29 \overline{)1.74}$   | (b) $0.51 \overline{)3.06}$   | (c) $0.67 \overline{)21.44}$ | (d) $0.94 \overline{)25.38}$ | 134 |
| 5. (a) $56 \overline{)478\ 296}$ | (b) $48 \overline{)695\ 328}$ | (c) $3.9 \overline{)205.53}$ |                              | 140 |

6. How many litres of water will this container hold?



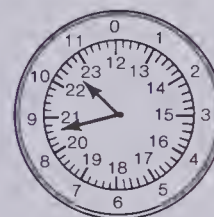
7. How many kilograms of water will this container hold?



8. Write the time 3 h 30 min after:

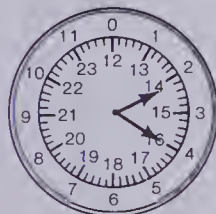


9. Write the time 4 h 23 min after:



10. How long

(a) from to



(b) from to



11. The temperature was  $8^{\circ}\text{C}$ , and then dropped  $22^{\circ}\text{C}$ .  
What would be the new temperature?

12. The temperature was  $-12^{\circ}\text{C}$ , and then rose  $+6^{\circ}\text{C}$ .  
What would be the new temperature?

129

130

132

134

140

144

146

150

## Extra Practice—Chapter Six

1. Write 3 multiplication facts for:

157

(a) 24                      (b) 42                      (c) 60                      (d) 72

2. List the set of factors for:

163

(a) 18                      (b) 30                      (c) 40                      (d) 54

3. Write as a product of prime factors:

169

(a) 20                      (b) 22                      (c) 30                      (d) 54  
(e) 64                      (f) 90                      (g) 108                      (h) 121

4. Write the numbers from this group that are prime numbers.

166

2, 7, 8, 14, 17, 27, 35, 41, 48, 51, 57, 69

5. Write the greatest common factor for each pair.

174

(a) 10 and 30              (b) 14 and 35              (c) 12 and 42              (d) 20 and 30

6. Write the least common multiple for each pair.

(a) 3 and 4                  (b) 6 and 10                  (c) 4 and 7                  (d) 5 and 8  
(e) 3 and 12                  (f) 6 and 15                  (g) 8 and 12                  (h) 12 and 20

7. Evaluate.

176-179

(a)  $5 \times 10^2$                   (b)  $2^3 \times 3^2$                   (c)  $5^2 \times 2^2$   
(d)  $(7 \times 10^3) + (2 \times 10)$       (e)  $(4 \times 10^5) \times (3 \times 10^2) + (2 \times 1)$

8. Write each of the following in expanded notation.

177

(a) 842                      (b) 1982                      (c) 100 025



# Extra Practice—Chapter Six

1. Write 3 multiplication facts for:

157

(a) 16                      (b) 48                      (c) 84                      (d) 100

2. Write the set of factors for:

163

(a) 28                      (b) 32                      (c) 48                      (d) 64

3. Write as a product of prime factors.

169

(a) 21                      (b) 25                      (c) 38                      (d) 50  
(e) 54                      (f) 75                      (g) 84                      (h) 96

4. Write the numbers from the group below that are:

159-161

(a) divisible by 2      (b) divisible by 3      (c) divisible by 4      (d) divisible by 9  
12, 15, 18, 22, 36, 48, 54, 60

5. Write the greatest common factor for each pair.

171

(a) 8 and 20              (b) 15 and 21              (c) 28 and 42              (d) 10 and 25

6. Write the least common multiple for each pair.

174

(a) 5 and 9              (b) 10 and 12              (c) 8 and 12              (d) 20 and 30

7. Evaluate. Write as a single numeral.

176-179

(a)  $10^3$                       (b)  $3^2 \times 10^2$                       (c)  $5^2 \times 10^3$                       (d)  $7 \times 10^6$

8. Write in expanded notation.

177

(a) 139                      (b) 3005                      (c) 84 000                      (d) 90 003

# Extra Practice—Chapter Seven

1. Replace each  $\bullet$ , using  $<$  or  $>$ . 190

(a)  $\frac{1}{2} \bullet \frac{2}{5}$

(b)  $\frac{3}{4} \bullet \frac{7}{10}$

(c)  $\frac{5}{8} \bullet \frac{3}{5}$

(d)  $\frac{1}{4} \bullet \frac{1}{3}$

2. Complete to make equivalent fractions. 188

(a)  $\frac{4}{5} = \frac{\blacksquare}{30}$

(b)  $\frac{1}{6} = \frac{\blacksquare}{30}$

(c)  $\frac{5}{8} = \frac{\blacksquare}{56}$

(d)  $\frac{9}{7} = \frac{\blacksquare}{28}$

Calculate. 187, 191

3. (a)  $\frac{7}{8}$   
 $- \frac{1}{8}$   
\_\_\_\_\_

(b)  $\frac{3}{4}$   
 $+ \frac{3}{4}$   
\_\_\_\_\_

(c)  $\frac{5}{9}$   
 $+ \frac{4}{9}$   
\_\_\_\_\_

(d)  $\frac{5}{8}$   
 $- \frac{1}{3}$   
\_\_\_\_\_

(e)  $\frac{1}{6}$   
 $+ \frac{4}{5}$   
\_\_\_\_\_

(f)  $\frac{9}{10}$   
 $- \frac{3}{4}$   
\_\_\_\_\_

4. (a)  $\frac{11}{12}$   
 $+ \frac{5}{8}$   
\_\_\_\_\_

(b)  $\frac{7}{8}$   
 $- \frac{1}{6}$   
\_\_\_\_\_

(c)  $2\frac{1}{3}$   
 $+ 5\frac{1}{6}$   
\_\_\_\_\_

(d)  $3\frac{4}{5}$   
 $- 1\frac{1}{2}$   
\_\_\_\_\_

(e)  $7\frac{3}{8}$   
 $+ 5\frac{3}{5}$   
\_\_\_\_\_

(f)  $3\frac{2}{3}$   
 $- 1\frac{8}{8}$   
\_\_\_\_\_

5. (a)  $\frac{3}{4}$  of 28

(b)  $\frac{2}{5}$  of 40

(c)  $\frac{1}{2}$  of 7

(d)  $\frac{2}{5} \times \frac{5}{8}$

6. (a)  $\frac{7}{12} \times \frac{4}{5}$

(b)  $3 \times 2\frac{1}{2}$

(c)  $5\frac{1}{4} \times 1\frac{1}{7}$

(d)  $1\frac{1}{5} \times 6\frac{2}{3}$

7. (a)  $7 \div \frac{1}{3}$

(b)  $\frac{3}{4} \div \frac{1}{4}$

(c)  $\frac{5}{8} \div \frac{1}{3}$

(d)  $\frac{8}{9} \div 2$

8. Write as a mixed numeral. 197

(a)  $\frac{17}{4}$

(b)  $\frac{25}{8}$

(c)  $\frac{83}{10}$

(d)  $\frac{17}{16}$

9. Write as a decimal. 200, 215

(a)  $\frac{7}{10}$

(b)  $\frac{19}{20}$

(c)  $\frac{8}{25}$

(d)  $\frac{5}{11}$

10. Solve for N. 207

(a)  $N + \frac{2}{3} = 1$

(b)  $\frac{7}{8} - N = \frac{1}{4}$

(c)  $N + \frac{1}{4} = \frac{7}{12}$

(d)  $\frac{1}{3} \times N = 4$

(e)  $N \times \frac{1}{2} = \frac{1}{6}$

# Extra Practice—Chapter Seven

188

1. Write the reciprocals for each.

209

(a)  $\frac{2}{5}$

(b)  $\frac{3}{4}$

(c)  $\frac{7}{4}$

(d) 3

2. Complete to make equivalent fractions.

(a)  $\frac{1}{2} = \frac{\blacksquare}{10}$

(b)  $\frac{3}{5} = \frac{\blacksquare}{40}$

(c)  $\frac{7}{9} = \frac{35}{\blacksquare}$

(d)  $\frac{5}{4} = \frac{\blacksquare}{20}$

Calculate.

187, 191

3. (a)  $\frac{7}{10} - \frac{1}{10}$  (b)  $\frac{9}{10} - \frac{7}{10}$  (c)  $\frac{7}{8} + \frac{1}{8}$  (d)  $\frac{4}{5} - \frac{1}{3}$  (e)  $\frac{5}{6} + \frac{2}{5}$  (f)  $\frac{7}{10} + \frac{1}{4}$

202-204

4. (a)  $\frac{5}{12} + \frac{3}{8}$  (b)  $\frac{5}{4} - \frac{5}{6}$  (c)  $2\frac{1}{2} + 3\frac{1}{6}$  (d)  $5\frac{7}{8} - 2\frac{3}{4}$  (e)  $1\frac{5}{6} + 4\frac{2}{5}$  (f)  $7\frac{4}{5} - 3\frac{1}{3}$

5. (a)  $\frac{2}{3}$  of 18 (b)  $\frac{4}{5}$  of 30 (c)  $\frac{1}{3} \times 5$  (d)  $\frac{3}{5} \times \frac{5}{6}$

6. (a)  $\frac{7}{10} \times \frac{5}{8}$  (b)  $3\frac{1}{2} \times 1\frac{1}{3}$  (c)  $3\frac{1}{3} \times 1\frac{1}{5}$  (d)  $7\frac{2}{3} \times 2$

7. (a)  $3 \div \frac{1}{2}$  (b)  $\frac{4}{5} \div \frac{1}{5}$  (c)  $\frac{3}{4} \div \frac{1}{2}$  (d)  $\frac{6}{7} \div 3$

8. Solve for N.

(a)  $\frac{3}{8} + N = \frac{7}{8}$

(b)  $\frac{7}{10} - N = \frac{1}{2}$

(c)  $9 \times N = 3$

9. Write as a decimal.

200, 215

(a)  $\frac{17}{100}$

(b)  $\frac{4}{5}$

(c)  $\frac{7}{25}$

(d)  $\frac{43}{50}$

10. Write as a mixed numeral.

197

(a)  $\frac{50}{9}$

(b)  $\frac{19}{5}$

(c)  $\frac{35}{8}$

(d)  $\frac{43}{7}$

11. Write as an improper fraction.

197

(a)  $7\frac{3}{5}$

(b)  $3\frac{5}{8}$

(c)  $2\frac{3}{4}$

(d)  $5\frac{5}{6}$



# Extra Practice—Chapter Eight

1. Write two equivalent ratios for each.

223

(a) 7:10

(b) 3 to 8

(c)  $\frac{9}{12}$

(d) 7 to 5

2. Find the missing term in these equivalent ratios.

(a)  $\frac{3}{8} = \frac{\blacksquare}{40}$

(b)  $\frac{10}{3} = \frac{\blacksquare}{12}$

(c)  $\frac{5}{12} = \frac{40}{\blacksquare}$

(d)  $\frac{11}{4} = \frac{33}{\blacksquare}$

3. Calculate cross products, and state which pairs of ratios are equivalent.

(a)  $\frac{3}{5}, \frac{12}{20}$

(b)  $\frac{12}{8}, \frac{4}{3}$

(c)  $\frac{3}{10}, \frac{21}{70}$

(d)  $\frac{12}{8}, \frac{6}{4}$

4. Copy and complete these ratios charts.

225

(a)	Jumbo paper cups	12	2	4	6	1	10	50	100
	Total cost	84				7			

(b)	Pens	3	9	12			28	30
	Total cost	57			323	418		

5. Express each as a percent.

226, 228

(a)  $\frac{3}{10}$

(b)  $\frac{17}{20}$

(c)  $\frac{14}{25}$

(d)  $\frac{3}{4}$

(e) 0.37

(f) 0.09

(g) 0.3

(h) 0.9

6. Express as decimals.

228

7. Express as reduced ratios.

233

(a) 32%

(b) 50%

(a) 60%

(b) 25%

(c) 5%

(d) 7%

(c) 52%

(d) 85%

8. Calculate.

230-231

(a) 10% of 35

(b) 6% of 50

(c) 1% of 900

(d) 12% of 60

(e) 8% of \$7.50

(f) 20% of \$18.50

9. Find the actual dimensions of this room.

scale ratio  
is 1:80.

6 cm

4 cm

238-239

10. Tina received the following marks on some math tests:

235-237

85%, 72%, 68%, 75%

Calculate her average mark.

# Extra Practice — Chapter Eight

1. Write three equivalent ratios for each.

(a) 8:10

(b) 5 to 9

(c) 7 to 3

(d)  $\frac{6}{5}$

2. Copy and complete.

(a)  $\frac{2}{7} = \frac{\blacksquare}{21}$

(b)  $\frac{9}{4} = \frac{\blacksquare}{20}$

(c)  $\frac{5}{11} = \frac{20}{\blacksquare}$

(d)  $\frac{10}{3} = \frac{50}{\blacksquare}$

223

3. Calculate cross products and state which pairs of ratios are equivalent.

(a)  $\frac{1}{2}, \frac{9}{18}$

(b)  $\frac{2}{3}, \frac{12}{21}$

(c)  $\frac{3}{8}, \frac{9}{24}$

(d)  $\frac{12}{16}, \frac{15}{20}$

4. Express each as a percent.

(a)  $\frac{1}{4}$

(b)  $\frac{11}{20}$

(c)  $\frac{21}{25}$

(d)  $\frac{4}{5}$

(e) 0.18

(f) 0.07

(g) 0.01

(h) 0.5

226, 228

5. Express as decimals.

(a) 91%

(b) 40%

(c) 8%

(d) 2%

228

6. Express as reduced ratios.

(a) 30%

(b) 75%

(c) 45%

(d) 88%

233

7. Calculate.

(a) 30% of \$800

(b) 7% of \$60

(c) 15% of \$90

(d) 20% of \$42.50

(e) 10% of \$75

(f) 6% of \$23.50

230-231

8. During seven consecutive exercise days, Saline did the following situps:

12, 17, 23, 20, 21, 30, and 31.

What was the average number of situps per day for that week?

235-237

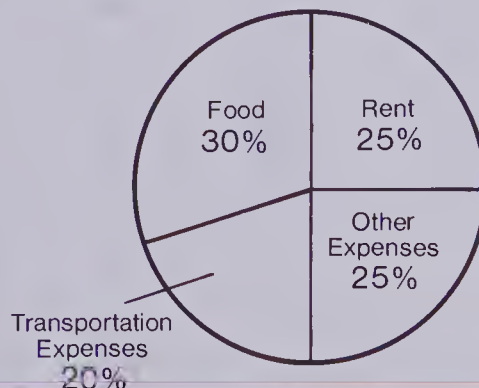
9. If the Gervais family monthly income after taxes is \$1400, calculate the amount spent each month on:

(a) rent

(b) food

(c) transportation

(d) other expenses



231

# Extra Practice — Chapter Nine

248

1. Calculate the balance after each entry.

246

	Date	Item	Withdrawals	Deposits	Balance
	April 20	Bal. Fwd.			138.09
(a)	April 24		10.76		■
(b)	April 27			20.00	■
(c)	April 28		15.85		■
(d)	April 30		7.98		■

2. Calculate the interest per year.

- (a) \$50 at 13%  
 (b) \$100 at 14%  
 (c) \$6000 at 15%  
 (d) \$75 at 12%  
 (e) \$54.50 at 14%

Copy and complete these charts.

251

3.

	Purchase	Regular Price	Discount Price	Discount Amount	Sale Price
(a)	bicycle	\$200	15%	■	■
(b)	winter coat	\$75	40%	■	■
(c)	shoes	\$27	25%	■	■
(d)	record	\$9.50	30%	■	■
(e)	sweater	\$37.50	50%	■	■

250

4.

	Purchase Price	Sales Tax Rate	Sales Tax Amount	Total Cost
(a)	\$50	7%	■	■
(b)	\$22.50	8%	■	■
(c)	\$250.50	6%	■	■
(d)	\$18 000	7%	■	■
(e)	\$235.25	8%	■	■

5. A jogger was running at 20 km/h. At this rate, how long (in minutes) would it take to run:

- (a) 1 km    (b) 5 km    (c) 10 km  
 (d) 50 km    (e) 13 km?

261

6. A leaky tap drips 14 L/d. How much water would be saved in a year (365 d) if this tap were repaired?

270



# Extra Practice — Chapter Nine

1. Calculate the balance after each entry.

246

	Date	Item	Withdrawals	Deposits	Balance
	April 1	Bal. Fwd.	—		\$82.23
(a)	April 3	—	—	\$9.50	■
(b)	April 8	—	—	\$4.25	■
(c)	April 12	—	\$5.95	—	■
(d)	April 16	—	—	\$10.75	■

2. Calculate the interest.

248

- (a) \$500 at 10%
- (b) \$800 at 12%
- (c) \$2000 at 14%
- (d) \$25 000 at 15%

Copy and complete these charts.

250

3.

	Purchase	Sales Tax Rate	Sales Tax Amount	Total Cost
(a)	\$30	7%	■	■
(b)	\$8.50	8%	■	■
(c)	\$135.50	6%	■	■
(d)	\$8000	7%	■	■
(e)	\$1500	8%	■	■

251

4.

	Regular Price	Discount Rate	Discount Amount	Sale Price
(a)	\$200	30%	■	■
(b)	\$25	20%	■	■
(c)	\$36	15%	■	■
(d)	\$75	35%	■	■
(e)	\$127.50	50%	■	■

5. Mr. Savatini calculates that he should save 35% on his home-heating bill by better insulating his home. His normal yearly heating cost is \$860. How much will he save by insulating?

270

# Extra Practice—Chapter Ten

277

1. Solve. Mark each solution on a number line.

(a)  $N + 3 = 7$       (b)  $N - 2 = 4$   
 (c)  $6 + N = 8$       (d)  $N + 8 = 8$

279

3. Write a related addition sentence for each. Solve.

(a)  $N - 12 = 14$       (b)  $M - 4.2 = 6.5$

282

5. Write a related division sentence for each. Solve.

(a)  $M \times 3 = 12$       (b)  $N \times 7 = 147$

300

7. Use graph paper to graph these points. Connect the points as indicated.

Join:  $(+1, -3)$ ,  $(+1, -2)$ ,  $(+3, -2)$ ,  $(+3, -1)$ ,  
 $(+2, -1)$ ,  $(+3, 0)$ ,  $(+3, +1)$ ,  $(+4, +1)$ ,  $(+3, +2)$ ,  
 $(+3, +3)$ ,  $(+2, +4)$ ,  $(0, +4)$ ,  $(-1, +3)$ ,  $(-2, +1)$ ,  
 $(-1, -1)$ ,  $(-1, -3)$ .

Make a large dot at  $(+2, +2)$ .

Join:  $(0, +1)$ ,  $(0, +2)$ ,  $(-2, +1)$ ,  $(0, 0)$ .

9. Draw a broken line graph to show the accumulated centimetres of snowfall.

Time	04:00	08:00	12:00	16:00	20:00	00:00
Centimetres	0	10	45	75	90	96

Calculate.

10.  $+3 + +7$

11.  $-2 + -6$

12.  $-5 + +2$

13.  $+3 + -2$

14.  $+3 - +5$

15.  $+3 - -1$

16.  $-3 - +5$

17.  $-3 - -5$

2. Write a related subtraction sentence for each. Solve.

(a)  $W + 14 = 34$       (b)  $R + 3.2 = 7.6$

278

4. Solve. Graph the solution on a number line marked in tenths.

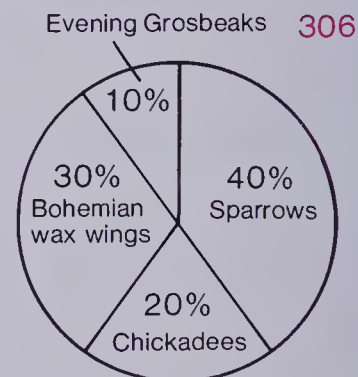
(a)  $M = 2.1 + 15$       (b)  $N - 3.1 = 16$

280

6. Write a related multiplication sentence for each. Solve.

(a)  $N \div 3 = 13$       (b)  $N \div 1.2 = 8.4$

8. 750 birds were counted altogether. How many evening grosbeaks were counted?



304

# Extra Practice — Chapter Ten

Solve. Mark the solution on a number line.

277

1.  $3 + N = 7$
2.  $12 + N = 15$
3.  $N + 33 = 33$
4.  $N - 3 = 1$
5.  $N - 2 = 5$
6.  $N - 0 = 4$
7.  $W - 5 = 0$
8.  $T + 4 = 9$

Write a related subtraction sentence for each. Solve.

278

9.  $N + 8 = 17$
10.  $W + 7 = 23$
11.  $X + 12 = 48$
12.  $Y + 26 = 42$
13.  $M + 2.3 = 6.8$
14.  $M + 8.9 = 27.8$
15.  $W + 23.3 = 46.1$
16.  $Z + 42.3 = 106.2$

Write a related addition sentence for each. Solve.

279

17.  $A - 3 = 9$
18.  $B - 8 = 26$
19.  $C - 15 = 32$
20.  $E - 38 = 56$
21.  $H - 4.1 = 6.2$
22.  $J - 6.7 = 12.3$
23.  $K - 16.2 = 18.8$
24.  $M - 56.9 = 56.9$

Write a related division sentence for each. Solve.

282

25.  $A \times 2 = 8$
26.  $D \times 3 = 27$
27.  $N \times 8 = 72$
28.  $N \times 12 = 144$
29.  $K \times 15 = 300$
30.  $N \times 1.2 = 1.44$
31.  $M \times 2.5 = 62.5$
32.  $N \times 3.1 = 93$

Write a related multiplication sentence for each. Solve.

283

33.  $B \div 2 = 12$
34.  $C \div 5 = 15$
35.  $N \div 6 = 17$
36.  $M \div 12 = 10$
37.  $N \div 1.5 = 4.5$
38.  $M \div 1.3 = 3.9$
39.  $K \div 2.8 = 8.96$
40.  $M \div 0.6 = 0.9$

Copy and complete each table.

288

41.

$2 \times \blacksquare + 2$

$\blacksquare$	0	1	2	3	4
$\blacktriangle$					
$(\blacksquare, \blacktriangle)$					

42.

$3 \times \blacksquare - 3$

$\blacksquare$	1	2	3	4	5
$\blacktriangle$					
$(\blacksquare, \blacktriangle)$					



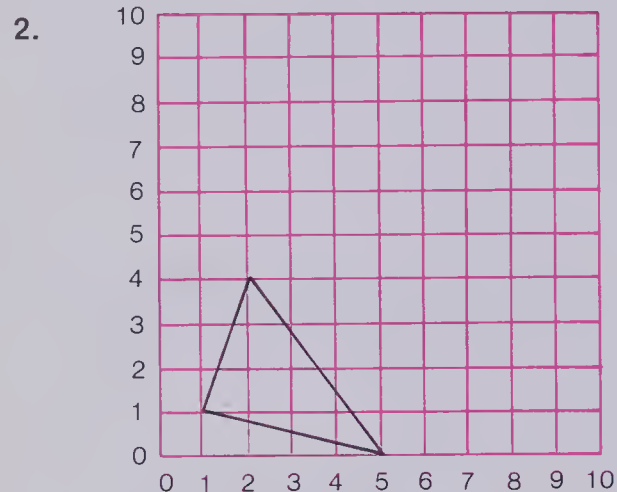
# Extra Practice — Chapter Eleven

1. Use this shape.  
Make a pattern that has rotational symmetry.



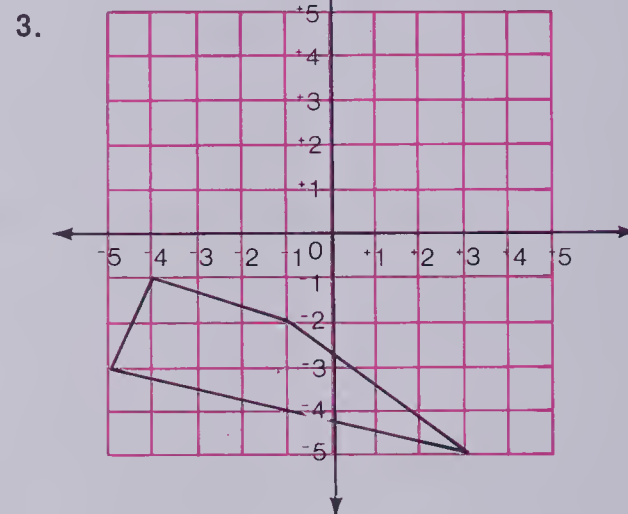
322

Copy and draw the images as indicated.



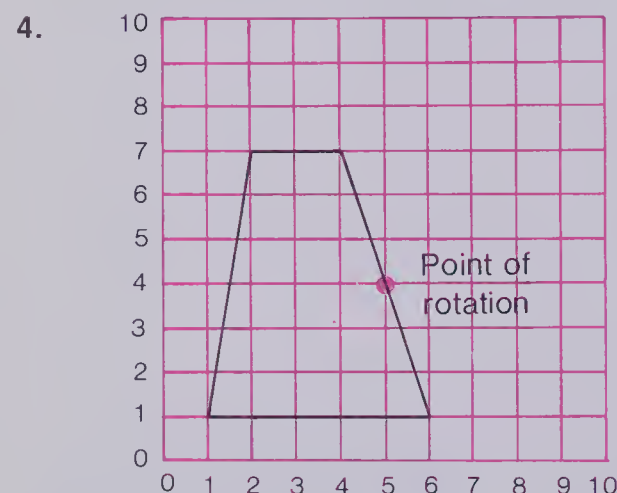
318

Slide: 4 right, 3 up



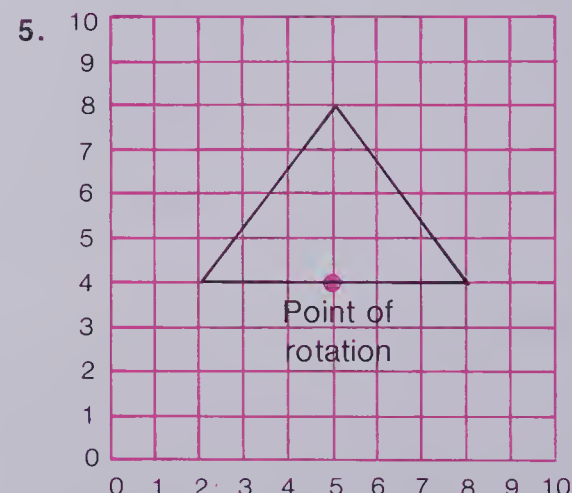
316

Reflection



320

Rotation:  $\frac{1}{2}$  turn



320

Rotation:  $\frac{1}{2}$  turn

6. Draw a segment of any length.  
Construct the perpendicular bisector.

325

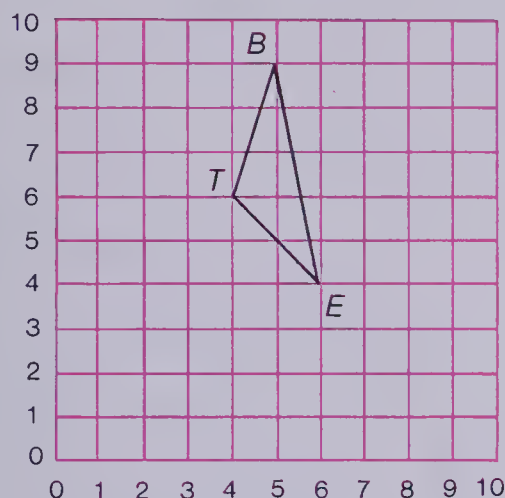
7. Draw any angle.  
Construct the bisector of the angle.

327

# Extra Practice—Chapter Eleven

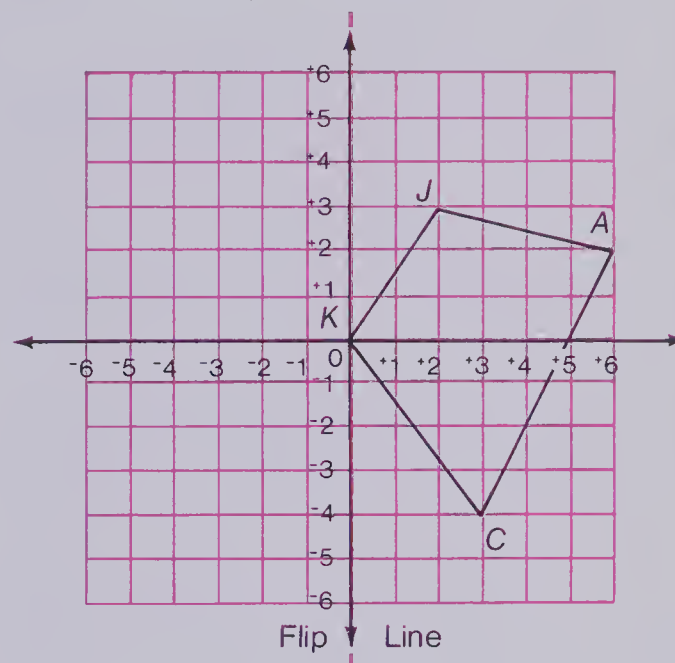
1. Copy  $\triangle BET$  on graph paper.  
Draw the image for the slide  
*left 4, down 3.*

318



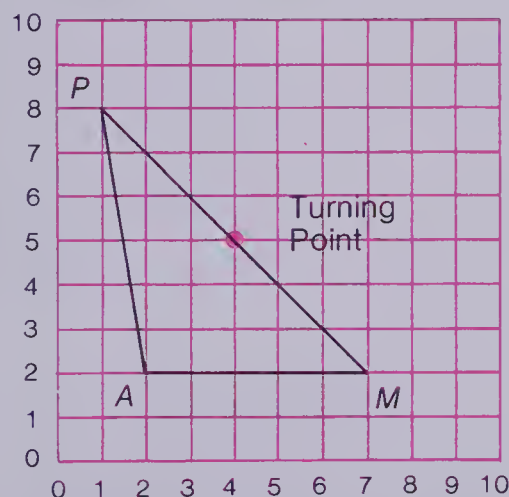
2. Copy quadrilateral  $JACK$ .  
Draw the image for a reflection  
over the flip line.

316



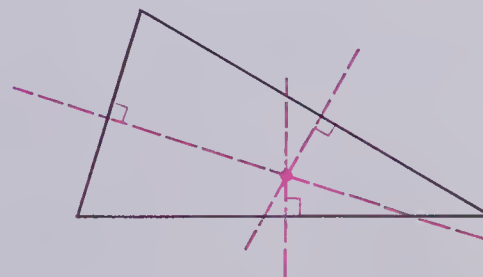
3. Copy  $\triangle PAM$ . Draw the image  
for a rotation of  $\frac{1}{2}$  turn about  
the turning point.

320



4. Draw any triangle.  
Construct the perpendicular  
bisectors of each side, so that  
the bisectors intersect.  
Repeat with other triangles.  
Do the bisectors always  
intersect at one point?

326-327



# Answers to Selected Problems

## Chapter 1

- Page 1** 3. (a) hundreds
- Page 2** 2. (a) 7.3 (b) 13.9 3. (a) hundredths
- Page 3** 2. (a)  $1\frac{7}{10}$  (e)  $36\frac{53}{1000}$  3. (a) 3.487
- Page 6** 1. (a) 8.6 (c) 9.2 (g) 68.41  
2. (a) 11.801 (b) 117.61
- Page 7** 1. (a) 32.53 (b) 57.290 2. 20.740  
(b) 88.463
- Page 8** 1. (a) 6.6 (c) 24.465 2. (a) 5.6
- Page 9** 1. (a) 3.13 (c) 24.38 2. (c) 22.48
- Page 12** 1. (a) 400 2. (a) 90 000 3. (a) 500 000  
4. (a) 9 000 000
- Page 13** 1. (a) 7.5 2. (a) 13.65 3. (a) 7
- Page 14** 2. about 2400; 2488 7. about 200; 199
- Page 18** 1. (a)  $\neq$  (b)  $=$  (f)  $=$
- Page 19** 1. (b) 24 (c) 18 2. (b) 8 (c) 6  
3. (a) 2 (b) 18
- Page 20** 1. (a)  $a = 5$  (c)  $b = 7$
- Page 21** 2. (a)  $a = 0.4$  3. (a)  $4 + 6 + 20$
- Page 25** 3. (a)  $\neq$  4. (a)  $>$
- Page 26** 1. (a)  $<$  (b)  $>$  (c)  $>$

## Chapter 2

- Page 30** 1. (a)  $R$  (b)  $RS$  and  $RP$   
(c)  $\angle SRP$ ,  $\angle PRS$ ,  $\angle R$
- Page 32** 1. Arrow  $A$  is  $20^\circ$ . Arrow  $B$  is  $90^\circ$ . Arrow  
 $C$  is  $160^\circ$ . 4.  $50^\circ$
- Page 44** 1. (a) perpendicular (b) parallel
- Page 52** 1. multiplication

## Chapter 3

- Page 59** 1. (a) 33 2. (a) 12 3. (a) 3
- Page 61** 1. (a) 800 4. (a) 7000 5. (a) 286 000
- Page 64** 1. 969 2. 1591
- Page 65** 1. 11 088 2. 23 664 6. (a) \$270.18  
(b) \$79.38
- Page 66** 1. 94 094 2. 251 712 4. (b) 566 740
- Page 67** 1. 80 465 2. 282 204  
3. (a) \$7542.85 4. (a) 230 138  
5. (a) 2 418 381
- Page 68** 1. (a) 2.4 (b) 2.1 3. (a) 25.2 (b) 58.2  
5. (a) 79.5 7. (a) 1424.4
- Page 69** 1. (a) \$2.25 (b) \$5.88 2. (a) 2.04  
3. (a) \$18.72 5. (a) 324.17
- Page 70** 1. (a) 0.4 (b) 0.9 2. (a) 0.8  
3. (a) 1.7 4. (a) 23.7
- Page 71** 1. (a) 2.4 (b) 3.5 2. (a) 16.2  
4. (a) 186.8
- Page 72** 1. (a) 115.6 (b) 88.4 3. (a) 3928.5  
5. (a) 15 974.2
- Page 73** 1. (b) 0.63 3. (a) 4.83 5. (a) 0.834  
6. (a) 7.491
- Page 74** 3. (a) 2.28 (b) 9.99 4. (a) 60.50  
5. (a) 92.34 7. (a) 2346.35
- Page 75** 1. (a) 0.28 (b) 0.18 2. (a) 0.04  
(b) 0.06 3. (a) 8.55 (b) 2.01  
4. (a) 10.95
- Page 76** 1. (a) 14.72 (b) 38.95 3. (a) 73.08  
5. (a) 2464.50
- Page 77** 1. (a) one (b) three 2. (a) 105.984  
(b) 324.945 3. (a) 107.9228  
(b) 9.0790 5. (a) 19.981 (b) 45.9025
- Page 78** 1. (a) 0.082 (b) 0.798 (c) 156.695  
3. (a) 200.448 4. (a) 10.469 88



**Page 82** 1. (a) 104 (b) 28 2. (a) 336 (b) 581  
(g) 201.9

**Page 84** 1. (a) \$150.00 2. (a) 67 920 000;  
67 318 563

**Page 85** 1.  $32 = N$  2.  $63 = d$

**Page 87** 1. (a) 812 196 3. (a) 1 172 224  
4. (a) 83 584 490 5. (a) 494 398 156

## Chapter 4

**Page 95** 1. (a) 7 (b) 9 2. (a) 6 (b) 9 3. (a) 4  
(b) 6

**Page 97** 2. (a) 128 3. (a) 229

**Page 98** 2. (b) 5

**Page 99** 5. (b) 25 6. (b) 206 7. (b) 356

**Page 100** 1. (b) 8 R 9 2. (b) 4 R 17

**Page 101** 5. (b) 502 R 83 6. (b) 912

**Page 102** 1. (a) 23.6 2. (a) 0.6 3. (a) 0.9

**Page 103** 1. (a) \$6.48 3. (a) 2.39 (b) 6.35

**Page 104** 1. 10 mm 2. 100 cm 3. 1000 cm

**Page 105** 1. 20 m 2. 26 m 4. 24 cm 12. 16 cm

**Page 107** 1. (a) 3.14 4. 28.26 cm

**Page 108** 1.  $18 \text{ m}^2$  7.  $128 \text{ cm}^2$  10.  $40 \text{ cm}^2$

**Page 109** 1.  $30 \text{ m}^2$

**Page 110** 1.  $24 \text{ cm}^2$

**Page 114** 2.  $1920 \text{ cm}^3$  8.  $610.08 \text{ cm}^3$

**Page 115** 2.  $1000 \text{ cm}^3$  3.  $2000 \text{ cm}^3$

**Page 116** 3.  $180 \text{ cm}^3$ ; 180 mL

**Page 118** 1. 1 kg; 0.5 kg; 3 kg

**Page 121** 3. 7003 m 9. 9.304 m

## Chapter 5

**Page 126** 2. (a) 240 3. (a) 1600

**Page 127** 1. 26; 260; 2600 4. 30; 300; 3000

**Page 128** 3. (a) 520 (b) 760 4. (a) 7260

**Page 129** 2. (a) 80 (b) 70

**Page 130** 1. (a) 30 (b) 20 2. (a) 90 (b) 60  
3. (a) 630

**Page 132** 1. (a) 9 (b) 8 2. (b) 5.6

**Page 133** 1. 900 2. 300 9. 74 10. 83  
17. 483 18. 972 25. 674.8  
26. 946.3

**Page 134** 1. 125 2. 72 9. 430 10. 980  
17. 9 18. 7

**Page 135** 1. 7000 2. 9000 9. 771 10. 892  
15. 8270 16. 3140

**Page 136** 1.  $\$225.78 \div 3 = n; n = \$75.26$

**Page 138** 1.  $\$40.00 - \$34.00 = \$6.00$ ; \$6.05

**Page 140** 1. (a) 5348 2. (a) 1242.8  
3. (a) 11 211.611 4. (a) 6.989  
5. (a) 0.125

**Page 141** 1. 0.25 2. 0.75

**Page 147** 1. (a) 7 h

**Page 149** 1. (a) 1st century

**Page 150** 2.  $5^\circ\text{C}$  3.  $0^\circ\text{C}$

## Chapter 6

**Page 157** 1. (b)  $1 \times 20 = 20$ ;  $2 \times 10 = 20$ ;  
 $4 \times 5 = 20$  (c)  $20 \div 20 = 1$ ,  
 $20 \div 1 = 20$ ,  $20 \div 10 = 2$ ,  
 $20 \div 2 = 10$ ;  $20 \div 5 = 4$ ,  
 $20 \div 4 = 5$

**Page 161** 1. 3 2. 3, 4 3. 3 11. 3, 6 12. 3  
13. 3, 6 21. 3 22. 3, 9 23. 3 31. 10  
32. 8 33. neither 41. 2, 3, 4, 6  
42. 2, 4, 5, 10 51. true

**Page 162** 1. 18, 2, 6

**Page 163** 1.  $1 \times 40$ ,  $2 \times 20$ ,  $4 \times 10$ ,  $5 \times 8$

**Page 164** 1. 7 6. 0

**Page 170** 1. (a) 2

- Page 171** 1. (a) 3 (b) 5 (c) 2 2. (a) 3 (b) 6  
3. (a) 2
- Page 176** 2.  $10^3$  8.  $10 \times 10$
- Page 177** 2.  $427 = (4 \times 10^2) + (2 \times 10^1) + (7 \times 1)$
- Page 179** 2.  $7^3 = 7 \times 7 \times 7$  8.  $5^3$  14. 32
- Page 180** Number of Cubes column: 8, 20, 16, 4;  
Total: 48

## Chapter 7

- Page 186** 1.  $\frac{7}{10}$  9.  $\frac{1}{10}$  15.  $\frac{6}{10}$
- Page 187** 1.  $\frac{2}{2} = 1$  16.  $\frac{1}{3}$
- Page 188** 1.  $\frac{6}{8}$  4.  $\frac{8}{10}$  7.  $\frac{8}{12}$
- Page 189** 1.  $\frac{1}{2}$  2.  $\frac{2}{3}$  3.  $\frac{1}{4}$
- Page 190** 1.  $\frac{2}{3} < \frac{4}{5}$  2.  $\frac{1}{4} > \frac{1}{5}$  3.  $\frac{1}{3} = \frac{2}{6}$
- Page 191** 1.  $\frac{3}{10}$  2.  $\frac{3}{6}$  9.  $\frac{5}{10}$  10.  $\frac{4}{9}$  12.  $\frac{5}{9}$
- Page 194** 1.  $\frac{23}{20}$  2.  $\frac{19}{15}$  11.  $\frac{5}{12}$  12.  $\frac{11}{40}$
- Page 195** 1.  $\frac{19}{20}$  2.  $\frac{2}{6}$  or  $\frac{1}{3}$  4.  $\frac{7}{40}$  8.  $\frac{47}{30}$  or  $1\frac{17}{30}$
- Page 197** 1.  $2\frac{1}{2}$  2.  $1\frac{2}{3}$  16.  $\frac{7}{2}$  17.  $\frac{7}{4}$
- Page 200** 1. 0.5 21. 0.723
- Page 201** 1. 1.95 2. 0.69
- Page 202** 1.  $4\frac{5}{6}$  2.  $3\frac{7}{10}$  3.  $1\frac{1}{15}$
- Page 203** 1.  $6\frac{1}{4}$  2.  $7\frac{4}{15}$  7.  $6\frac{1}{12}$
- Page 204** 1.  $5\frac{7}{12}$  2.  $5\frac{13}{20}$  3.  $5\frac{11}{20}$
- Page 205** 1. 2 2. 3 3. 9 4. 4
- Page 206** 1.  $1\frac{2}{3}$  2.  $1\frac{2}{4}$  or  $1\frac{1}{2}$  3.  $1\frac{4}{5}$  4.  $3\frac{3}{4}$
- Page 207** 1.  $\frac{1}{4}$  2.  $\frac{1}{5}$  12.  $n = \frac{3}{5}$  13.  $n = 2$
- Page 208** 1.  $\frac{3}{10}$  2.  $\frac{3}{12}$  or  $\frac{1}{4}$  3.  $\frac{4}{10}$  or  $\frac{2}{5}$  4.  $\frac{3}{20}$
- Page 209** 2.  $n = \frac{4}{3}$  3.  $n = \frac{1}{5}$  4.  $n = 2$
- Page 210** 1. 20 2. 10 3. 5 8.  $\frac{3}{10}$  9.  $\frac{1}{3}$

**Page 211** 1. 7 2.  $1\frac{1}{5}$  3.  $1\frac{1}{2}$

**Page 213** 1.  $2\frac{1}{3}$  2.  $5\frac{5}{6}$

**Page 215** 1. 0.25 5. 0.04

**Page 216** 1. 0.1666... 14. 0.0909...

**Page 217** 11. (a) 0.222

## Chapter 8

**Page 223** 1.  $\neq$  2.  $=$  13. 6 20. 1 23.  $\frac{4}{5}$

**Page 224** 1. (a) 10 km (b) 2.5 km (c) 4 km  
(d) 20 km

**Page 226** 1. 60% 13. 70% 14.  $\frac{40}{100} = 40\%$   
15.  $\frac{45}{100} = 45\%$  16.  $\frac{48}{100} = 48\%$

**Page 228** 1. (a) 0.25 (b) 0.03 2. (c) 0.85  
(d) 0.07 3. (a) 75% (b) 2%

**Page 230** 1. 9 2. 28 3. 8

**Page 231** 1. \$3.20 2. \$39.50

**Page 232** 1. (a) 0.33 3. (a) 8.3%

**Page 233** 1.  $\frac{3}{10}$  2.  $\frac{3}{5}$  3.  $\frac{1}{4}$

**Page 235** 1. 10 2. 10

**Page 240** 1. 200 cm

**Page 241** 1. a rectangle 2 cm by 3 cm  
2. a square with sides 5.5 cm

## Chapter 9

**Page 246** 1. (a) \$68.87 (b) \$73.62 (c) \$63.47

**Page 248** 1. Interest Earned: \$7.00; New Balance:  
\$107.00

Page 249 1. \$60.00 2. \$20.00

Page 250 2. (a) Sales Tax: \$0.07;  
Total Cost: \$1.07

Page 251 1. Discount: \$100.00; Sale Price:  
\$400.00 2. Discount: \$5.70;  
Sale Price: \$13.30

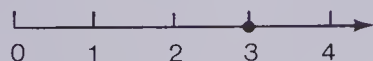
Page 252 1. \$0.21 2. \$8.02

Page 253 1.  $\$0.35 + \$0.95 = n$ ;  $\$1.30 = n$

Page 254 1.  $20 = n$  2.  $30 = n$  3.  $30 = n$   
11.  $5 = n$  13.  $40 = n$

## Chapter 10

Page 277 5.  $M = 3$



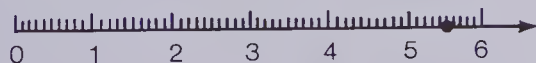
Page 278 1. (a)  $N = 4$  (b)  $N = 4$  2. (a)  $N = 5$   
(b)  $N = 5$  8.  $N = 10 - 6$ ;  $N = 4$

Page 279 1. (a)  $N = 8$  (b)  $N = 8$  2. (a)  $N = 7$   
(b)  $N = 7$  8.  $N = 3 + 6$ ;  $N = 9$

Page 280 5.  $M = 2.6$



Page 281 5.  $N = 5.5$



Page 282 1. (a)  $N = 3$  (b)  $N = 3$  2. (a)  $N = 6$   
(b)  $N = 6$  8.  $N = 30 \div 3$ ;  $N = 10$

Page 283 1. (a)  $N = 20$  (b)  $N = 20$  2. (a)  $N = 21$   
(b)  $N = 21$  8.  $N = 10 \times 10$ ;  $N = 100$

Page 294 1. (a) right (b) right

Page 295 1.  $+4 + +5 = +9$  2.  $+3 + +6 = +9$   
7.  $+10$  11.  $-8$

Page 296 1.  $+3 + -7 = -4$  2.  $-4 + +6 = +2$   
7.  $-1$  11.  $+1$

Page 297 1.  $-3$  2.  $-7$  13.  $n = 0$  16.  $n = -8$

Page 298 1.  $+3 - +2 = +1$ ;  $+3 + -2 = +1$   
2.  $+4 - +5 = -1$ ;  $+4 + -5 = -1$



# Index

## A

Acute angle, 36, 37  
 Addition  
     and estimation, 14  
     like integers, 295  
     of decimals, 6, 7  
     positive and negative integers, 296  
     practice, 4, 39, 245  
     problem solving, 4, 39  
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QA 107 H78 1980 BK-6 C-5  
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Holt, Rinehart and Winston of Canada, Limited

ISBN 0-03-920038-8

